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THE
QUARTERLY JOURNAL
OF
ECONOMICS

*NOVEMBER, 1921*

# THE ORIGIN OF THE EIGHT-YEAR GENERATING CYCLE

SUMMARY

The persistence of the eight-year generating cycle in England for one hundred and sixty years; the congruence of the eight-year crop cycles in England, France, and the United States; the persistence of the eight-year meteorological cycles, and their congruence in Europe and America; the congruence of the economic and meteorological cycles — these uniformities and agreements suggest that their cause must be sought in a cosmical cycle. The probable cause is the planet Venus in its eight-yearly periodic motion with respect to the Earth and the Sun.

I. Economic cycles, 2. — II. Meteorological cycles, 8. — III. The cause of the eight-year generating cycle, 18.

GENERATING economic cycles are to be described as economic cycles that have their origin in non-economic causes and become the originating source of derived economic cycles. The theory of generating cycles embraces three fundamental inquiries: first, as to the existence of generating cycles, their length, amplitudes and phases; second, as to the ways in which the generating cycles work out their rhythmic effects in remote phases of economic life; and third, as to the cause of generating cycles. In other essays I have dealt with the first and second of these divisions. The present paper attempts to place the cause of the eight-year generating cycle.

## I. Economic Cycles

If index numbers of the annual yield per acre of American crops are plotted for a considerable period, from 1882 to the present time, for example, the graph will be a composite of three types of changes — secular, cyclical, and random — which were long ago classified and described by Cournot. In a recent article in this Journal [1] I eliminated the secular changes in the yield per acre of the six leading crops in American agriculture, and then formed index numbers of their percentage deviations from the respective secular trends. The series of index numbers was then scrutinized with a view to finding evidence of a real, recurring cycle, and Figure 1

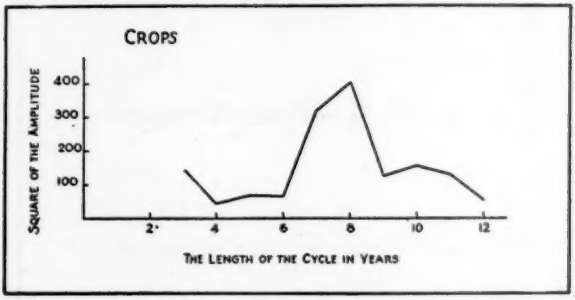


Figure 1. Periodograph of the yield per acre of American crops.

shows that of all possible cycles between three and twelve years in the index numbers of the yield per acre of the crops, the most probable length is in the neighborhood of eight years. If an eight-year cycle is fitted, by the method of least squares, to the index numbers of yield, the maxima of the repeated cycle fall, approximately, at 1882, 1890, 1898, 1906, 1914. In other

1. "Generating Cycles of Products and Prices," February, 1921.

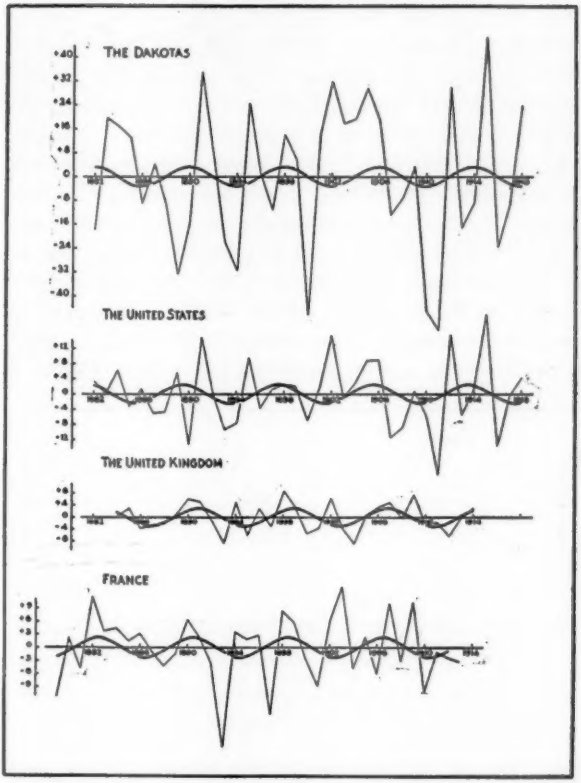


FIGURE 2. Cycles in the yield of wheat, oats, and barley in the Dakotas, the United States, the United Kingdom, and France.

The Dakotas: $y = 3.20 \sin (\frac{360°}{8}t + 93° 9')$, origin at 1882;
The United States: $y = 2.49 \sin (\frac{360°}{8}t + 111° 27')$, origin at 1882;
The United Kingdom: $y = 3.02 \sin (\frac{360°}{8}t + 142° 0')$, origin at 1884;
France: $y = 2.17 \sin (\frac{360°}{8}t + 292° 56')$, origin at 1879.

studies[2] referring to the Dakotas, the United States, the United Kingdom, and France, the eight-year cycles were isolated and were found to be practically synchronous in these countries. Figure 2 shows the graph descriptive of the eight-year cycles in the yield of wheat, oats, and barley.

With the existence of an international cycle in the yield of the crops firmly established, an obvious corollary suggested that according to the law of demand — in consequence of which the price tends to fall with an increase in the supply of the commodity — there should be a derived eight-year cycle in the prices of farm products. Accordingly, the law of demand for the six representative American crops was ascertained, and the derived cycle of prices of farm products was computed from the established eight-year cycles in the yield of the crops. The results are presented in Figure 3, together with a comparison between the actual index numbers of prices and the forecast indices of prices.[3]

After ascertaining that the prices of agricultural products do actually vary inversely with the yield in a definite, predictable way, it became possible to subject the theory of the existence of generating cycles of crops to a severe critical test. If the prices of agricultural commodities do vary inversely with the yield, and if there is a real cycle of eight years in the yield of the crops, then the record of prices throughout a long interval should reveal the existence of the eight-year generating cycle of crops. Moreover, if the generating cycle is a persistent, real cycle, then the cycle of yield per acre that is revealed indirectly by the record of prices

2. "Crop-Cycles in the United Kingdom and in the United States," Journal of the Royal Statistical Society, May, 1919; "Crop-Cycles in the United Kingdom and in France," ibid., May, 1920; "Forecasting the Crops of the Dakotas," Political Science Quarterly, June, 1920, particularly pp. 228, 229.

3. Figure 3 is taken from "Generating Cycles of Products and Prices," in this Journal, February, 1921, p. 227.

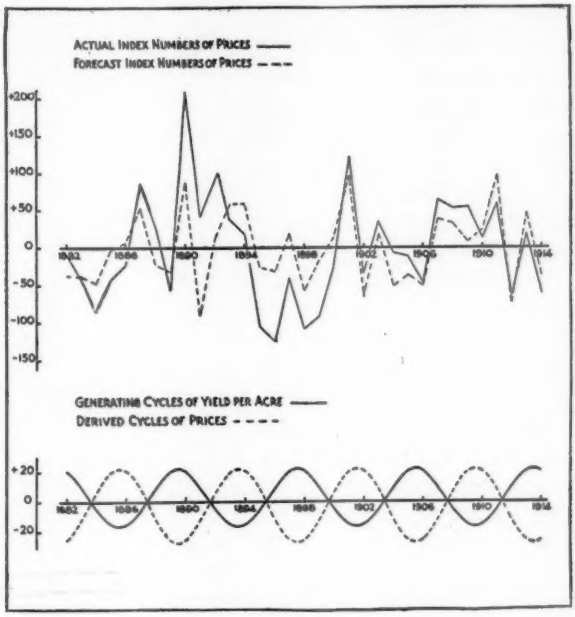


FIGURE 3.

Upper part: Actual index numbers of prices of the six representative crops and the index numbers of prices forecast from the index numbers of the yield per acre by means of the formula

$$y = -1.295x - .02.$$

Lower part: Generating cycles of the yield per acre of the crops,

$$y = 1.6 + 20.0 \sin (45°t + 109°),$$ origin at 1882;

Derived cycles of prices of the crops computed from the generating cycles of yield by means of the formula,

$$y = -1.295x - .02.$$

throughout a long interval should be the same as the cycle that is obtained directly from the more recent official estimates of the actual yield per acre. Figure 4 shows not only that the record of prices in England from 1760 to 1875 exhibits a clear-cut cycle of eight years in the yield per acre,[3a] but also that the cycle is

3a. Figure 4 is taken from "Generating Cycles Reflected in a Century of Prices," in this Journal, August, 1921, p. 520.

continuous with the eight-year cycle which is established directly from the official estimates of the crop yields since 1884.

The theory of the generating cycle also requires that the movement of general prices should follow the rhythmic changes in the yield of agricultural products. As nearly all foods are derived either directly or indirectly from the farms, and as eighty per cent of the raw materials of manufactures — according to the United States census of 1900 — are organic raw materials produced on the farms, the movement of general prices should reflect the rhythm in the yield of the crops. Here it became possible to subject the theory of the relation between the generating cycles of crops and the movement of general prices to a searching empirical test. Sauerbeck's index numbers of general prices, covering the interval of nearly a century between the Napoleonic wars and the Great War, were examined by means of Fourier analysis with a view to discovering real periodicities. The analysis showed that if there were a sequence of real cycles in the century of prices in England, the most probable length of the constituent cycle was approximately eight years. When this cycle of general prices was computed and plotted, its graph was found to be practically congruent with the graph of the yield of wheat which was determined indirectly from the record of wheat prices from 1760 to 1875, and practically congruent with the graph of the cycles in the yield of the crops which was determined directly from the official estimates of the annual yield of the crops since 1884. The graphs are given in Figure 4.

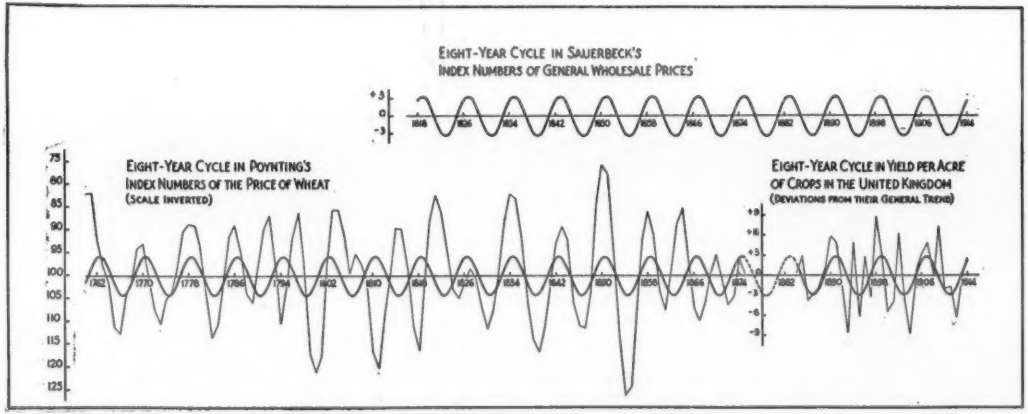
EIGHT-YEAR CYCLE IN SAUERBECK'S
INDEX NUMBERS OF GENERAL WHOLESALE PRICES
EIGHT-YEAR CYCLE IN POYNTING'S
INDEX NUMBERS OF THE PRICE OF WHEAT
(SCALE INVERTED)
EIGHT-YEAR CYCLE IN YIELD PER ACRE
OF CROPS IN THE UNITED KINGDOM
(DEVIATIONS FROM THEIR GENERAL TREND)

FIGURE 4. Generating cycles reflected in a century of prices.
Upper curve: $y = 3.5 \sin (\frac{360°}{8}t + 51°)$, origin at 1818. Derived from the 8.73 and 7.38 years Fourier constituents of Sauerbeck's index numbers.
Lower curves: Poynting's index numbers, $y = 100.2 + 4.4 \sin (\frac{360°}{8}t + 248°)$, origin at 1762;
Yield per acre of the crops, $y = 3.0 \sin (\frac{360°}{8}t + 142°)$, origin at 1884.

## II. Meteorological Cycles

In 1919 the Carnegie Institution published *Climatic Cycles and Tree-Growth*, by A. E. Douglass. With the hope of throwing some light on the periodic activity of the sun, Professor Douglass, by training and profession an astronomer, undertook this laborious and valuable investigation of the variation in the size of the rings of trees, which, he assumed, was a consequence of meteorological changes having their origin in solar activity. He selected for his first studies yellow pines taken from the forests of northern Arizona. As there is, for the most part, a scant and variable rainfall throughout the state, Professor Douglass assumed as a working theory (1) that the growth of pines in that region depends largely upon the available water; (2) that the rings of the pines measure the growth of the trees; (3) that the rings form a measure of annual precipitation.

The rainfall of Arizona is extremely variable from station to station. "Storms come from the Pacific coast and rain occurs a day or so later than in southern California. Spring and autumn are the dry seasons, and the warmest time of the year is usually in June, just before the summer rains begin. The summer rains occur in July and August and often come in 'spells' that last a week or two, with thunderstorms in the afternoons or at night, followed by clear mornings. Unlike the winter storms, the summer rains are local and apt to be torrential in character, with heavy run-off." The San Francisco Peaks, ten miles north of Flagstaff, "illustrate how meteorological data may vary in rugged localities. The west slopes of these mountains are exposed to the westerly storms and have an immense snowfall. Springs abound, and all favorable localities are

taken up as ranches. East of the mountain, however, the land is dry and barren, and long distances intervene between watering places. . . . In a very rugged country like that about Prescott similar differences between east and west mountain slopes must constantly occur."

The longest meteorological record in the Arizona pine forest was begun at Whipple Barracks, near Prescott, in 1867, and then continued at Prescott, which has

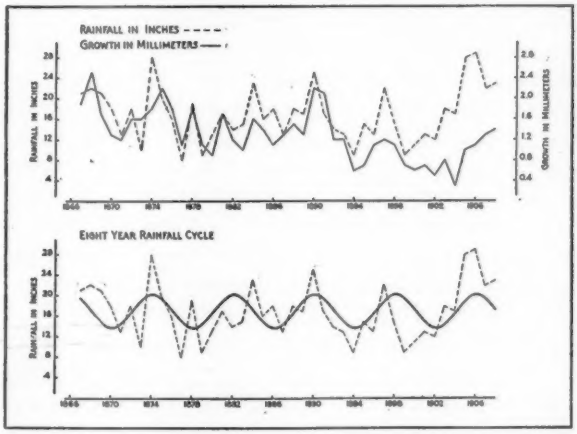


FIGURE 5. Cycles in the rainfall and in the growth of pines near Prescott, Arizona. Equation to the rainfall cycle, $y = 16.9 + 3.2 \sin (\frac{2}{3}\frac{4}{5}\frac{0}{0}°t + 127° 12')$, origin at 1867.

an elevation of about 5200 feet. With the variability of rainfall from station to station which we have just noted, and with the change of the meteorological observation from Whipple Barracks to Prescott, one would scarcely expect any normality to be revealed in this particular rainfall record. An examination of Figure 5 is, nevertheless, surprisingly suggestive. The top graph [4] shows the relation between the annual rainfall and the

4. The top graph is taken from Professor Douglass' work, p. 29.

growth of pines near Prescott. The growth seems to show a secular trend downwards and for that reason, in seeking the degree of relation between the annual rainfall and the annual growth, I have computed the correlation between their first differences. The measure of this relation is $r = .56$, which shows that there is an unmistakable relation between the rainfall and the growth of pines in this region.

Is the rainfall itself subject to law? In the lower part of Figure 5 an eight-year cycle is fitted to the annual rainfall data, and we find that the maxima occur at 1866, 1874, 1882, 1890, 1898, 1906 — which makes the Prescott rainfall, during this interval, synchronous with the crop cycles in the United States, in the United Kingdom, and in France. Gratifying as this result is, I should not attach importance to it — because of the meteorological record being made up of observations at two different stations in a country in which the rainfall is notoriously variable from station to station — but for its relation to what is about to be described.

Flagstaff, in Arizona, is about 67 miles north of Prescott. From the magnificent pine forests about Flagstaff Professor Douglass was able to obtain cuttings from trees which supplied him with a continuous history of rings for 500 years. Referring to these Flagstaff pines, Professor Douglass makes these statements as to the cyclical variations in their growth: "The interval from 1830 to the present time divides . . . fairly well in (a period) of 7.3 years" (p. 108). As to the whole record of 500 years, he says, "a 7-year period is also frequently observed" (p. 101). In Table 8 (p. 108) Professor Douglass indicates that this cycle of approximately 7.3 years has been continuous since 1817. By an odd coincidence Sauerbeck's index numbers of general prices in England begin just one year later, in 1818.

In the analysis of the Sauerbeck numbers we found[4a] that the eight-year cycle was the mean of two cycles, one of about 8.7 and the other of about 7.38 years. In Figure 6 the smooth graph records the 7.38-year cycle in Sauerbeck's index numbers, and the dashed graph,[5] the

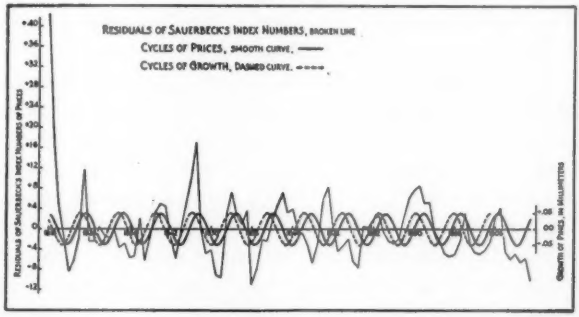
RESIDUALS OF SAUERBECK'S INDEX NUMBERS, BROKEN LINE
CYCLES OF PRICES, SMOOTH CURVE.
CYCLES OF GROWTH, DASHED CURVE.
RESIDUALS OF SAUERBECK'S INDEX NUMBERS OF PRICES
GROWTH OF PINES, IN MILLIMETERS

FIGURE 6. Cycles in the residuals of Sauerbeck's index numbers of general wholesale prices in England and in the growth of pines near Flagstaff, Arizona.
Equation to the cycle of prices, —— : $y = 3.1 \sin (\frac{360°}{7.38}t + 92°)$, origin at 1818;
Equation to the cycle of growth, ····· : $y = .05 \sin (\frac{360°}{7.38}t + 137° 57')$, origin at 1818.

Douglass 7.3-year cycle in the Arizona pines. The two graphs, considering the errors in the estimated lengths of the cycles, are practically congruent, and from 1867 to 1910 the Douglass 7.3-year cycles in tree growth at Flagstaff run well with the eight-year cycles in the rainfall at Prescott.

The close relation between meteorological cycles and crop cycles is informingly illustrated in the crops of the spring-wheat area in the United States. In 1916, among the states of the United States, North Dakota ranked first in the production of spring wheat,

4a. "Generating Cycles Reflected in a Century of Prices," in this Journal, August, 1921.

5. The data to which the cycle was fitted covered the 88 years from 1818 to 1905 and were taken from Professor Douglass' work, p. 113.

second in the production of barley, and seventh in the production of oats; and to these three crops, in 1918, seventy per cent of its crop area was devoted. The semi-arid region of the United States begins to the west of the one-hundredth meridian, and this meridian divides nearly in two the state of North Dakota. The average precipitation does not greatly exceed the minimum that is essential for vegetation, and, consequently, we find a close correlation between the crop yield and the rainfall of the critical months, which are May and June. The correlation coefficients[6] between the rainfall of May and June and the yield of the crops are, for wheat, $r = .66$; for oats, $r = .79$; and for barley, $r = .73$.

With this close relation between rainfall and crop yields established for this very important, semi-arid agricultural region, one is again led to inquire whether the rainfall itself is not subject to law.[7] The rainfall records of North Dakota and South Dakota, for May and June, from 1882 to 1918 were searched for evidence of periodicity between the limits of three and twelve years, and the result indicated that, if there is a real cycle of rainfall for May and June in these two representative states its most probable value is in the neighborhood of eight years. When an eight-year cycle is fitted to the rainfall data, the maxima occur, approximately, at 1882, 1890, 1898, 1906, 1914, and are practically synchronous with the dates of the maxima of rainfall of Prescott, Arizona, the growth of pines in Arizona, and the maxima of the international crop cycles in the United States, in the United Kingdom, and in France. The graph of the Dakota rainfall is given in Figure 7.

6. "Forecasting the Crops of the Dakotas," Political Science Quarterly, June, 1920, p. 219.

7. This question I have treated in a paper on "Forecasting the Crops of the Dakotas," Political Science Quarterly, June, 1920.

Starting from the hypothesis that American economic activity is largely dependent in its ebb and flow upon the prosperity of the agricultural Middle West, I sought, in an early study [8] of meteorological cycles, to discover

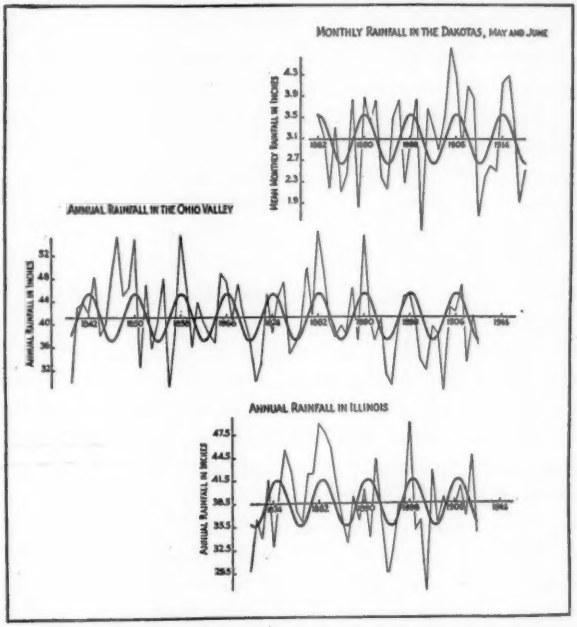
MONTHLY RAINFALL IN THE DAKOTAS, MAY AND JUNE
HIGH MONTHLY RAINFALL IN INCHES
ANNUAL RAINFALL IN THE OHIO VALLEY
ANNUAL RAINFALL IN INCHES
ANNUAL RAINFALL IN ILLINOIS
ANNUAL RAINFALL IN INCHES

FIGURE 7. Cycles in the rainfall of the Dakotas, of the Ohio Valley, and of Illinois.
Dakota cycle: $y = 3.09 + 0.45 \sin (\frac{8}{3}\frac{0}{0}0° t + 84° 39')$, origin at 1882;
Ohio cycle: $y = 41.2 + 4.13 \sin (\frac{8}{3}\frac{0}{0}0° t + 310° 41')$, origin at 1839;
Illinois cycle: $y = 38.5 + 3.05 \sin (\frac{8}{3}\frac{0}{0}0° t + 241° 52')$, origin at 1870

a periodicity in the rainfall of the Mississippi Valley. As the meteorological records were much longer for the Ohio Valley than for the states further west, the rainfall of the Ohio Valley was made the basis of the first examination. The method employed was a test of the

8. Economic Cycles: Their Law and Cause, 1914.

possible presence of cycles between the limits of three and thirty-three years, and the evidence was unmistakable. If there is a real cycle of rainfall in the Ohio Valley its most probable length is about eight years and its maxima are approximately synchronous with the maxima of the May and June rainfall of the Dakotas, the annual rainfall of Prescott, Arizona, the growth of pines in Arizona, and the international crop cycles to which we have so frequently referred. The graph is given in Figure 7.

At the time of the publication of the essay *Economic Cycles*, 1914, Illinois was regarded as our leading cereal-producing state, ranking first in the production of corn and second in the production of oats. Rainfall records for many stations in that state were available for a period of 41 years, from 1870 to 1910. The correlation between the rainfall in the Ohio Valley and the rainfall of Illinois was $r = .60$, and the eight-year cycle in the Ohio Valley rainfall was repeated in an eight-year cycle in the rainfall of Illinois. The graph is likewise given in Figure 7.

In October, 1920, H. W. Clough of the United States Weather Bureau published in the *Monthly Weather Review* an article on "An Approximate Seven-Year Period in Terrestrial Weather, with Solar Correlation." From this paper I make use of two facts: the first refers to atmospheric pressure at Toronto, in Canada, and at St. Louis, in the United States. In Mr. Clough's paper a graph is given of atmospheric pressure at Toronto from about 1843 to 1911, and a similar graph is given for the pressure at St. Louis from about 1874 to about 1917. An inspection of these shows (1) that for the interval covered by the two graphs, they are approxi-

mately congruent; (2) that the maxima occur, approximately at 1850, 1858, 1866, 1874, 1882, 1890, 1898, 1914, and are therefore synchronous with the economic and meteorological cycles already examined.

The other fact that I take from Mr. Clough's paper refers to atmospheric pressure in Europe. "Mauer (*Archives des Sci. Phys. Nat.*, Geneva, May, 1918) called attention to a well-marked periodicity of seven to eight years in the winter pressure in Central Europe, with maxima as follows: 1818–19, 1827–28, 1835–36, 1843–44, 1850–51, 1857–58, 1865–66, 1873–74, 1881–82, 1889–90, 1897–98, 1904–05, 1912–13."

If now the dates of the maxima in Mauer's European pressures are compared with Clough's in America, it will be seen (1) that they are approximately synchronous; (2) that the common interval between the maxima is about eight years; (3) that they are approximately synchronous with the maxima of the crop cycles in the United States, in the United Kingdom, and in France; (4) that they are approximately synchronous with the cycles in Sauerbeck's index numbers from 1818 to 1914.

The next evidence of meteorological cycles is found in an official publication by the United States Weather Bureau. In 1901 the United States took "the lead in reducing its barometric observations to a standard system."[9] The work was conducted by Professor F. H. Bigelow and included "a reëxamination of the various elevations, the local and instrumental errors, the reduction of the station pressures to a homogeneous system, and the preparation of normal tables and charts of pressure, temperature, and vapor pressure at sea level and at the 3,500 foot and 10,000 foot planes."[10] This

9. Prefatory note in vol. ii of Report of the Chief of the Weather Bureau, 1900, 1901.
10. Report of the Chief of the Weather Bureau, 1900–01, vol. i, p. 12.

monumental work bears the title *Report on the Barometry of the United States, Canada, and the West Indies,* and constitutes volume II of the *Report of the Chief of the United States Weather Bureau, 1900, 1901.*

After the completion of this Report with the reduced and standardized material, it became possible for the first time to combine the many thousands of observations that had been made in the United States since the beginning, in about 1870, of the systematic work of official weather observation. The tremendous importance of this great increase in the utilizable meteorological observations is shown in what is, I think, the most pregnant conclusion of Professor Bigelow's Report. I shall quote that conclusion at length and invite particular attention to a few sentences which I have put in italics. The table referred to in the quotation is one in which the final mean pressures for the whole of the United States and for the several constituent large sections are presented. In detail, the barometric pressure series upon which the generalization was based were obtained from the following sections: North Atlantic, South Atlantic, Lake Region, Pacific, West Gulf, North Plateau, South Plateau, and from the records of these regions all combined into a general mean. The pregnant quotation is now given:

> We are at once struck by the remarkable fact, which constitutes an *important discovery in barometric science,* that the secular variations of the barometer from year to year are by no means accidental but a phenomenon of definite proportions. In looking over the tables it is seen that for certain years the barometric reading is persistently lower than the average of the series, and for certain other years it remains higher than the average. This fact is indicated, generally, by each station in the group, most conspicuously for the year 1878. The residuals of that year are persistently minus, about −0.050 inch *for each station in every group for the entire United States;* for the year 1883 they are as persistently plus, about +0.020 inch. This constitutes a range of 0.070 inch, and when we consider that the

annual range in the barometer, due to the change of the sun in latitude from +23° to −23°, causing the change in the seasons, the difference between winter and summer, is shown by Table 54 to be about 0.100 inch, we conclude that *we are dealing with a phenomenon which at times is seven-tenths of the annual departure in its intensity.* The fact is that the barometric pressure is sometimes maintained higher than the average throughout the entire year over a large continental area in middle latitudes, and that it often equals at least half as much as the influences of the sun's action on the atmosphere by departing 23 degrees in latitude from the equator; in other years the pressure is kept lower than the average by a similar amount. *The years of maximum pressure are 1874–75, 1882–3, 1890, 1896–7, with an interval of about 8 years between them successively; the years of minimum pressure are 1878, 1884–5, 1893, also having an interval of about 8 years. . . .*"

In seeking for the causes of this phenomenon, I confess that it has been difficult to assign one which is satisfactory. It cannot be a wave motion because the duration of each wave is too long to admit of anything resembling propagation. One suspects that there may be a tilting of the atmosphere from one continent to another, or from one hemisphere to the other, but when we consider the rapid motion of the upper strata of the atmosphere, it does not appear how it can so far deviate from its usual paths as to leave an entire continent lower or higher than the average for so long a time. *One may also suspect purely cosmical causes* due to the variable solar output; indeed, these barometric variations do closely follow the variations in the sunspot frequency and the other products of the sun's variable activity. From 1873 to 1890 there is a remarkable agreement between these two classes of phenomena, *but if the pressure period is 8 years and the sunspot period 11 years that connection cannot be complete in its nature.* It is evident that we shall be obliged to prosecute this study yet further by constructing similar barometric tables for other countries, in each hemisphere, and also that it will be well to include in our research some account of the temperature, the vapor tension, and the magnetic and electric fields of the atmosphere before attempting any further remarks on the subject. . . .

Finally, it is evident that for the United States we can now correlate the years which have similar secular variations, as 1878, 1885, and 1893, and study them climatologically to see if there are any marked and prevailing features which characterize them. *It is clear that this discussion opens to us for the first time the prospect of a scientific basis for seasonal forecasts,* certainly so if it should prove to be the case that the maximum-pressure years differ distinctly from the minimum-pressure years in their seasonal character, for in

the event of our happening on a maximum year we could then predict the feature due to a falling barometer, or, if we are in a minimum year, to a rising barometer, at least for one or two years ahead.[11]

Upon the preceding passages I make these notes:

(1) As far back as 1901 the United States Weather Bureau isolated a cycle in the barometric pressure of the United States;

(2) That cycle was an eight-year cycle which was synchronous with the cycles in economics and meteorology to which constant reference has been made in this essay;

(3) Professor Bigelow regarded the isolation of the cycle as "an important discovery in barometric science," the discussion of which "opens to us for the first time the prospect of a scientific basis for seasonal forecasts";

(4) Professor Bigelow suspected a cosmical cause of the phenomenon, but known solar periodicities failed to satisfy the conditions: "if the pressure period is 8 years and the sun-spot period is 11 years that connection cannot be complete in its nature."

What is the cosmical cause of the eight-year cycle?

## III. The Cause of the Eight-Year Generating Cycle

Is there a cosmical cycle of approximately eight years in length, the effects of which upon the Earth might account for the observed meteorological cycles? Let us divide this question into two and ask (1) is there a cosmical cycle of eight years in length which is synchronous with the observed meteorological cycles? (2) is there reason for believing that the cosmical cycle

11. Report of the Chief of the Weather Bureau, 1900, 1901, vol. ii, pp. 1004, 1005.

is accompanied with a synchronously varying force that could produce the observed meteorological cycles?

The first question may be answered definitely and positively: there is a cosmical cycle of about eight years that is synchronous with the economic and meteorological cycles the existence of which has already been established.

Perhaps the best way to approach its description is to consider these facts: the maximum visibility of Venus is produced by its greatest phase, its greatest elongation from the sun, and the clearness of our atmosphere, and that maximum tends to recur at intervals of eight years. "Vénus passe tous les huit ans par ses périodes de plus grand éclat (1889–1897–1905–1913). Elle est alors si brillante qu'elle porte ombre comme un petit clair de lune, et il est facile de s'en assurer soit en se plaçant dans une pièce obscure, soit en marchant devant un mur à la campagne. On peut la distinguer en plein jour, à l'œil nu, non seulement avant le coucher du soleil, mais à midi même, lorsque l'on sait où elle est. Aucune étoile ni aucune planète n'atteint un éclat comparable à celui-là." [12] Here is an eight-year cycle in which the dates of maxima are a little in advance of our economic and meteorological cycle. It is not the cycle that we want, but it is closely related to the one for which we are in search.

Before passing to a detailed consideration of the Venus cycle a prejudice must be noted and, if possible, removed. In suggesting that the variability in the brilliance of Venus may have some possible relation to terrestrial affairs one is reminded at once of the disdainful attitude of Laplace: "Vénus surpasse en clarté les autres planètes et les étoiles; elle est quelquefois si brillante, qu'on la voit en plein jour, à la vue

12. Camille Flammarion, Rêves étoilés, pp. 132, 133.

simple. Ce phénomène qui revient assez souvent, ne manque jamais d'exciter une vive surprise; et le vulgaire, dans sa crédule ignorance, le suppose toujours lié aux événements contemporains les plus remarquables."[13] Now with regard to this remark, the substance of which is repeated by others in pamphlets and treatises, these comments should be made:

(1) Laplace's scorn was directed towards the prognosticators who encouraged the belief that particular, isolated events were predictable from the aspect of Venus.

(2) Until many years after the death of Laplace, economic and meteorological observations had not been carried sufficiently far to admit of the isolation of long-time cycles showing mean results which could be associated with cosmical variations.

(3) Many physicists and astronomers of unquestioned sanity and proven ability have attempted to discover the effect of Venus upon the position and frequency of sunspots. If that is not a visionary inquiry when Venus is nearly three times further from the Sun than it is from the Earth, the consideration of the possible effects of that planet upon the weather of the Earth should not be regarded as a preposterous undertaking.

Returning now to the question of the periodicity in the motion of Venus with respect to the Earth let us first recall that the relative distances of the Earth and Venus from the Sun are as 1000 to 723; that the orbits of both planets are nearly circular; and that in size, Venus of all the planets most nearly approaches the Earth, its diameter being 7630 miles as compared with the 7918 miles of the Earth.

Let Figure 8 represent the orbits of Venus and the

13. Laplace, Exposition du système du monde, Livre premier, chap. v.

Earth, the orbits being assumed, for the sake of simplicity, to be circles. At this stage no account is taken of the inclination of the plane of the orbit of Venus, which will be considered later on. The following simple

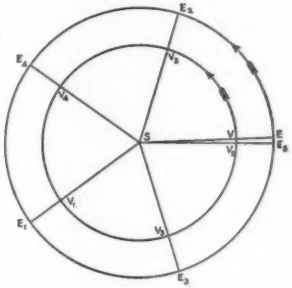


FIGURE 8. Illustration of the conjunctions of the Earth and Venus.

description of when and where the two planets are in conjunction is given by R. A. Proctor in his *Transits of Venus:*

Imagine that a straight pointer from the Sun to Venus, extending to the Earth's orbit, like the line SVE, is carried round S as a central pivot by the motion of the planet Venus. Then whenever this pointer comes up to the Earth, the three bodies — Sun, Earth, and Venus — are in conjunction. Now, Venus travels with a mean motion of 96′ 7″.8 per day around the Sun (completing a revolution in 224.701 days), while the Earth travels with a mean motion of 59′ 8″.3 (completing a revolution in 365.257 days); so that in each mean solar day Venus gains, on the average, 36′ 59″.5 upon the Earth. This is the rate at which our imaginary pointer, starting from a position such as SVE, sweeps onwards from the advancing Earth, so as to again reach the Earth by overtaking it, just as the minute-hand of a clock, after being in conjunction with the hour-hand, passes on towards its next conjunction, with the *excess* of its motion over the hour-hand. We have only, then, to ask how long it will take the pointer, with its mean daily gain of 36′ 59″.5, to gain one complete circuit, to have the interval in time between successive conjunctions of the Earth and Venus—in other words, there will be just as many days in this interval as the number of times 36′ 59″.5 is

contained in 360°, or, reducing both tc seconds, as 2219.5 is contained in 1,296,000. The division . . . gives us 583.9 days.

Our Venus-carried pointer thus takes 583.9 days in overtaking the Earth. This is more than a year by about 218.6 days, in which period, with her mean motion of 59′ 8″.3 per day, the Earth travels round nearly 215½ degrees. Now, 216 degrees would be ⅗ of a complete circuit. We see, then, that the next conjunction-line must be set almost exactly ⅗ of the way round from SVE, or in the position $SV_1E_1$; the next will have the position $SV_2E_2$; the third will have the position $SV_3E_3$; the fourth, the position $SV_4E_4$; and the fifth will be close up to SVE, in the position $SV_5E_5$, about 2½ degrees behind SVE.

Since the interval between each conjunction is about a year and three-fifths, the whole time occupied before the position $SV_5E_5$ is reached by the conjunction-line will be five times 1⅗ years, or 8

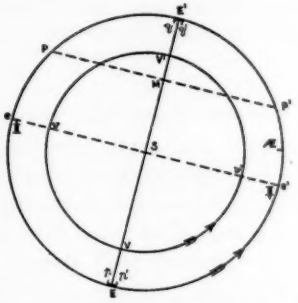

FIGURE 9. The transit regions (pp′ and qq′) in the Earth's orbit.

years, less the short interval corresponding to the Earth's motion over the arc $E_5E$. We see, then, how it comes to pass that an interval of eight years brings round nearly the same circumstances as at the beginning of the interval, and why, therefore, when a transit has occurred, another may occur eight years later. . . .

And now let us consider the effect of the inclination of the orbit of Venus to that of the Earth, still, for the sake of simplicity, leaving out of account the slight eccentricity of the orbits.

If EE′, VV′ (Figure 9), represent the two orbits,[14] and Æ be the place of the Earth at the autumnal equinox, then the line EE′ represents the intersection of the two orbit-planes; and if, as before, we regard the plane of the paper as containing the orbit EE′,

14. In the description of Figure 9 I have altered slightly Proctor's lettering so as to correspond with the use I shall make of the reasoning later on. Proctor starts with the transit of 1631 while I begin with that of 1761.

then the part V′vV of the path of Venus is to be regarded as slightly above, the part Vv′V′ as slightly below, the plane of the paper. Accordingly the end of the pointer which we have supposed Venus to carry round the Sun, passes above the semi-circle E′eE and below the semi-circle Ee′E′. And supposing this pointer to be of the length SE, so that its end appreciably travels round Ee′E′e (except for the displacement below and above the plane of this orbit), it is easy to calculate how much above or below the level Ee′E′e the end of the pointer runs. When in the direction SE or SE′, of course the Venus-carried pointer has its extremity on the Earth's path; when in direction Sve or Sv′e′, at right angles to EE′, the end of the pointer is at its farthest from the plane Ee′E′e. The inclination of the orbit of Venus being about 3° 23½′, and the distance Se (the Earth's distance from the Sun) being about 91,430,000 miles,[15] it is easily calculated that the extremity of the pointer passes above *e* and below *e′* at a distance of about 5,409,000 miles. At any other point, as P or P′, the end is above or below by an amount less than 5,409,000 miles in the same degree that PM or P′M is less than eS, or e′S (PMP′ being drawn square to EE′).

By means of this theorem Proctor computes that the length of the transit regions pp′, qq′ is about 3° 28′.

Figure 10 will facilitate the discussion of the eight-year cycle of Venus in its relation to the Earth and the Sun. In 1761 and in 1769 there were June transits of Venus and in 1874 and 1882 there were December transits. Let us assume that at the 1761 transit the Earth and Venus stood in their orbits at the points V and E. Then according to the reasoning which has just been traversed the next inferior conjunctions of Venus and the Earth were at $E_1V_1$, $E_2V_2$, $E_3V_3$, $E_4V_4$, $E_5V_5$. The conjunction at $E_5V_5$ was just 2° 22′ behind the point at which Venus and the Earth stood eight years before, and as $E_5$ fell within the transit region there was a June transit in 1769. Now just as the fifth conjunction $E_5$ was 2° 22′ behind E, so the sixth conjunction occurred 2° 22′ behind $E_1$; the seventh, 2° 22′ behind

15. Proctor's work, Transits of Venus, was published in 1875. Since that date the mean distance of the Earth from the Sun has been ascertained to be about 92,900,000 miles. The difference between Proctor's figures and the real distance affects the accuracy of his subsequent calculations.

$E_2$; the eighth, 2° 22′ behind $E_3$; the ninth, 2° 22′ behind $E_4$; and the tenth, 2° 22′ behind $E_5$. In case of all five of the conjunction regions, there were inferior conjunctions 2° 22′ behind the points of conjunction

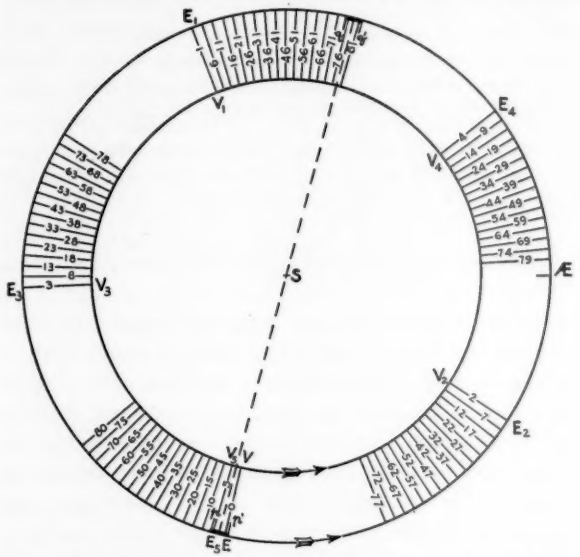


FIGURE 10. The regression of the conjunction lines of Venus and the Earth.

which occurred eight years previously. The sequence is followed out in Figure 10 to the 81st conjunction.

If now we keep the eye upon the two transit regions pp′, qq′, we observe that the recession of the conjunction lines at the rate of 2° 22′ in eight years caused the conjunctions in the region VE to recede from the transit region pp′, and those in the region $V_1E_1$ to approach the transit region qq′. The distance of $E_1$ from E is about 215½° and the distance of the transit region qq′ from the transit region pp′ is 180°. As the transit region is

itself about 3° 28′, it is obvious that the distance of $E_1$ from the transit region is about 34°; and as the conjunctions in the region $E_1$ approach the transit region qq′ at the rate of 2° 22′ every eight years while the conjunctions in the region pp′ recede at the rate of 2° 22′ every eight years, it is clear that a conjunction must occur within 17° of either the pp′ or the qq′ transit region every eight years. It is this eight-yearly conjunction in the neighborhood of the transit regions which is synchronous with the eight-yearly terrestrial phenomena that we have already described. This eight-yearly cycle is the Venus cycle for which we have been in search.

Up to this point no account has been taken of the small eccentricities in the orbits of the Earth and Venus and of the unequal motions of the planets in the different parts of their orbits. The consequences of these facts are so well known that they have been calculated,[16] and it is sufficient for our purpose to observe that the eight-year sequence in the transit regions — the Venus cycle — still persists when the eccentricities of the orbits and the varying motions of the planets are taken into consideration.

We see, therefore, that in 1761 and again in 1769 the Earth, Venus and the Sun were in a straight line in the transit region pp′; they were again in a straight line in 1874 and 1882 in the transit region qq′. Between the limiting dates 1761 and 1882, at intervals of approximately eight years, the Earth, Venus, and the Sun, in this sequence, made their nearest approach to being in a straight line. After 1882 until the date of the next transit in 2004, the Earth, Venus and the Sun will make this maximum approach to a straight line, in this sequence, at intervals of approximately eight years.

16. Proctor, Transits of Venus, pp. 111–118.

Now the longest record we have of economic cycles is given in Figure 4, which is the record of the crops in England. That invaluable sequence runs from 1760 to 1914. The maxima of the crop cycles occurred at 1762 and at intervals of eight years thereafter. The Venus cycle had maxima in June 1761 and approximately eight years thereafter, so that at intervals of eight years before and after the dates of the last transits in December 1874 and 1882, the maxima of the economic, meteorological, and Venus cycles were congruent.

We come now to the second part of our question: is there reason for believing that the Venus cycle is accompanied with a synchronously varying force which could produce the observed meteorological cycles? Here our point of departure is a comparatively recent discovery of great importance relating to the period of rotation of Venus upon its axis.

From the observations of some faint markings supposedly on the surface of Venus, Domenico Cassini of Bologna in 1666–67 inferred that the period of rotation was about twenty-three hours. J. J. Cassini, in 1740, gave a more exact estimate of twenty-three hours and twenty minutes. Schroeter, in 1789, fixed the period at twenty-three hours and twenty-one minutes, and De Vico, in 1839–41, carried the spurious accuracy to twenty-three hours, twenty-one minutes, and twenty-two seconds. So the matter remained until 1890, when Schiaparelli announced his surprising discovery.

Schiaparelli made the innovation of conducting his observations by day, as near to noon as possible, when Venus would be highest and its own glare reduced by the brilliant midday sky. From a long series of careful observations he concluded that the period of rotation of Venus upon its axis could be nothing like twenty-

four hours, but must lie between six and nine months and very probably agreed exactly with its period of revolution around the Sun, which is, approximately, 225 days.

In 1896 the question was made the subject of research by Percival Lowell with the assistance of an accomplished staff, at his observatory in the clear air of Flagstaff, Arizona. The markings noted by Schiaparelli upon which he based his conclusions as to the long period of rotation were verified at the Lowell Observatory, and in addition new markings were discovered and photographed. "By watching them assiduously it was possible to note that no change in position occurred in them, first through an interval of five hours, then through one of days, then of weeks. Care was taken to guard against illusion. It thus became evident that they bore always the same relation to the illuminated portion of the disk. This illuminated part, then, never changed. In other words, the planet turned always the same face to the Sun. The fact lay beyond a doubt, though of course not beyond a doubter." [17] Thirteen years after these first discoveries Professor Lowell repeated, in 1909, the account of his early work and then said "the years that have passed since these observations were made have brought corroboration of them. Several observers at Flagstaff have seen and drawn them and added discoveries of their own." [18]

The conclusion that the period of rotation of Venus upon its axis is the same as its period of revolution around the Sun was reached by Schiaparelli and Lowell from telescopic observations. There was, of course, the possibility, tho not the probability, that both observers had been misled by visual errors. But no such

17. Percival Lowell, The Evolution of Worlds, pp. 77–79.
18. Ibid., p. 79.

deception could occur with the spectroscope, and to make sure of his ground Lowell installed at his observatory a spectroscopic equipment. The investigator was Dr. Slipher, the present Director of the Lowell Observatory. The accuracy with which Dr. Slipher could determine the rotation period of a planet by means of spectrograms was tested by his spectroscopic approximation of the well known periods of rotation of Mars and Jupiter. The rotation period of Mars is known to be $24^h\ 37^m\ 23^s.66$. Dr. Slipher determined its period from spectrograms within an hour of the true time. The rotation period of Jupiter is $9^h\ 50^m.4$. Dr. Slipher found the rotation period from spectrograms to be $9^h\ 50^m$, or within a minute of the exact time. When in an exactly similar manner, he made his observation of Venus, the spectrograms showed that the rotation period must exceed three months, which meant that so slow a rotation as three months was beyond the power of Dr. Slipher's spectroscope to disclose.[19]

Lowell regarded Dr. Slipher's spectrogram report as confirmatory of Schiaparelli's conclusion and his own that Venus rotates on its axis in the same time that it revolves around the Sun, turning always the same side to the source of light and heat.

The bearing of this discovery upon the theory of the effect of Venus upon terrestrial meteorological cycles we shall approach by considering the following quotation from Lowell: "That Venus turns on her axis in the same time that she revolves about the Sun, in consequence of which she turns always the same face to him, must cause a state of things of which we can form but faint conception, from any earthly analogy. One face baked for countless aeons, and still baking, backed by one chilled by everlasting night, while both are still

19. Lowell, The Evolution of Worlds, pp. 83–89.

surrounded by air, must produce indraughts from the cold to the hot side of tremendous power. A funnel-like rise must take place in the centre of the illuminated hemisphere, and the partial vacuum thus formed would be filled by air drawn from its periphery which, in its turn, would draw from the regions of the night side. Such winds would sweep the surface as they entered, becoming less superficial as they advanced, and the marks of their inrush might well be discernible even at the distance we are off." [20]

The last part of this quotation is perhaps hyperbole. I am very far from wishing to suggest that the winds of Venus may be directly responsible for the periodicity in terrestrial weather. Our question is this: is there reason for believing that the Venus cycle is accompanied with a synchronously varying force which could produce the terrestrial meteorological cycles? The consequence of the long rotation period of Venus with the one face always turned towards the Sun is that the planet is in a constant state of violent meteorological commotion on a vast scale; and this planet, which is about the size of the Earth, thrusts itself at intervals of eight years almost exactly in the direct path of radiation from the Sun to the Earth. Is it not probable that the storm-racked planet creates a disturbance in the interplanetary medium which affects the Sun's radiation on its way to the Earth? If that is the case, then the cause of the eight-year generating cycle is the planet Venus in its eight-yearly periodic motion with respect to the Earth and the Sun.

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20. The Evolution of Worlds, pp. 80–82.

# THE RAILROADS UNDER GOVERNMENT OPERATION. II. FROM JANUARY 1, 1919, TO MARCH 1, 1920[1]


SUMMARY

I. Characteristics of this period, 30. — II. Labor policies. The national agreements, 35. — Extreme standardization of wages, 36. — Centralization in dealing with disputes and impairment of discipline, 39. — III. Relations with state commissions, 41. — Rate adjustments, 43. — Policy toward further advances in rates, 45. — Final refusal to make advances, 45. — IV. Upkeep of physical property. Provisions of the Control Act, 47. — Financial figures indicate adequate maintenance, figures in terms of physical units do not, 50. — The case of freight cars, 51. — V. Additions and betterments, 54. — VI. Financial result of the entire period of federal control, 57. — VII. How far the Administration policy of unification has proved permanent, 61. — VIII. Conclusion, 67.


## I. Characteristics of the Second Period

The situation with which the Director General of Railroads had to deal during the second year of federal control of railroads was different in many respects from that of 1918. During the first year (1918) the controlling motive was to operate the railroads as an effective part of the government's war organization. The compelling forces of patriotism were behind the employees, the officials, and the general public. The railroad organization worked faithfully to produce the kind and the volume of transportation which was vitally necessary for war purposes, and the public coöperated willingly in accepting war-time restrictions in service. As has already been indicated, the results were fairly satis-

1. For the first article, on the period to the close of 1918, see this Journal for February, 1921.

factory from the viewpoint of the emergency which federal control was intended to meet.

The less satisfactory record of 1919, the second year of federal control, may be partly explained by the changed conditions. The spur of patriotism behind the working forces was lacking. The war-time tension relaxed almost immediately after the signing of the armistice and there was a distinct lowering in morale. Shippers, travelers, and state-regulating authorities began a campaign to restore the pre-war status. Congress adopted a critical attitude toward the Railroad Administration and withheld the appropriations recommended by the Director General. The decline in traffic and the shrinkage in net income compelled a closer scrutiny of expenses. The atmosphere was befogged by propaganda designed to create a favorable public attitude toward each of the many plans advanced for the solution of the railroad problem, and practically all of the propagandists set out to discredit the record of the Railroad Administration. Then, too, there was the normal reaction on the part of the general public against the continuation of war-time government control.

Just before Mr. McAdoo's retirement from the office of Director General he advocated a continuation of federal control for five years. The Federal Control Act provided that the railroads should be returned to their owners within twenty-one months "following the date of the proclamation by the President of the exchange of ratifications of the treaty of peace." Mr. McAdoo expressed the view that federal control during one year of war and one or two years of the reconstruction period (on the eve of a presidential campaign) would not furnish an adequate test of the advantages of unified operation. He feared that most of the "fundamental reforms" inaugurated during his régime as

Director General could not be continued "if the country prefers to continue in existence the hundreds of different railroad companies as in the past." He believed that a five-year extension of operation by the government would permit the successful carrying out of a farsighted program of improvement and further unification of facilities, and that this additional experience in federal operation under peace conditions would give the desired demonstration of the value of unified control and direction. With such further experience as a guide Congress could more intelligently take up the task of legislating for a permanent solution.[2]

On January 11, 1919, Mr. McAdoo retired as Director General and was succeeded by Walker D. Hines, his principal assistant. When Mr. Hines, early in February, appeared before the Senate Committee on Interstate Commerce, he supported his predecessor's suggestion that the tenure of federal control be continued for five years. At the same time he made certain suggestions embodying his own views as to what should be the basis of a permanent plan for adoption at the end of the five-year period.

In advocating an extension of federal control Mr. Hines placed himself on the defensive. The opinion was held in some quarters that the Railroad Administration was more interested in perpetuating itself than in responding to the general public demand for legislation which would bring about a safe and speedy return of the roads to private management. Mr. Hines, however, never ardent in his advocacy of an extension of federal control, soon changed his position. In a number of public addresses throughout the South and West during the late spring and early summer of 1919 he suggested a plan

2. Statement of Mr. McAdoo before the Committee on Interstate Commerce, United States Senate, January 3, 1919.

of his own under which the roads would be restored to their owners as soon as the necessary legislation could be enacted, and under which they would be operated in a small number of large systems, their directorates to include representatives of the government and of labor.

Throughout his entire term of office Mr. Hines was subjected to much criticism. It should be noted, however, that this criticism came from nearly every one of the divergent interests. The view of the railroad executives was that the Administration was not always fair in its treatment of the interests of the owners of the properties, as for example in the matter of maintenance, and that its failure to advance rates in 1919 to meet the higher operating costs unfairly placed upon the railroads the onus of advancing rates after the roads were returned. These rate advances were made necessary, in greater part, by radically increased wage scales and by the adoption during the closing months of federal control of the restrictive rules in the so-called national agreements. On the part of labor Mr. Hines was criticized because in the latter part of 1919 he refused to be stampeded into granting additional concerted wage demands from practically every class of railroad labor. Instead he insisted that these demands should be reviewed by a tribunal to be appointed by Congress for that specific purpose. Congress, however, refused to entertain the suggestion and reminded the Director General that he had ample authority to deal with the situation himself. On the part of shippers there was dissatisfaction because many of the privileges which were curtailed during the war were not promptly or fully restored, and because requests for downward revision of certain rates were not all favorably acted upon. On the part of Congress there was fault-finding because of the large operating deficits and there was a disposition to embarrass the Railroad

Administration by neglecting to provide the working capital which Mr. Hines recommended. On the part of the state commissions there was resentment against the continuation of the war-time power of the federal administration, which crippled the states in their efforts to resume intrastate rate regulation on the pre-war basis.

It will be seen, therefore, that Mr. Hines' administration failed to satisfy any one group, and that he was beset with difficulties much greater than those with which Mr. McAdoo had to deal during his war-time régime. Mr. Hines had a thankless task. No review of his stewardship would be complete if it failed to record a tribute to his courage in adhering consistently to his conception of his responsibility to the broad and long-time interests of the nation. He remained in office at a substantial personal sacrifice and severely taxed his health by devotion to his work. If he made mistakes in policy, they were as a rule the result of an over-conscientious attitude toward his duty as the representative of the government. During a large part of his term in office he was unable to consult freely with the President and therefore was obliged in many important matters of policy to act upon his own initiative and responsibility.

At the time of his appointment as Director General Mr. Hines announced that he proposed to carry forward the policies "so ably put into effect by Mr. McAdoo — fidelity to public interest, a square deal for labor, with not only an ungrudging but a sincere and cordial recognition of its partnership, and fair treatment for the owners of the railroad properties and for those with whom the railroads have business dealings." [3]

Within the limits of this article it is possible to touch

3. Public statement, January 11, 1919.

only upon the more important phases of Mr. Hines' administration. These had to do with labor policies; coöperation with state and interstate regulating authorities; rate increases and adjustments; control of maintenance expenditures; and enlargement and improvement of facilities and equipment.

## II. Labor Policies

Large increases in wage rates and expensive concessions to labor on conditions of employment were phenomena of the war. Their effects upon the railroad payroll were probably no greater in degree than upon the labor costs of other industries. In fact the general average percentage of increase in railroad wage rates during the years 1918 and 1919 was probably less than in other directions. The railroad increases, however, affected payrolls containing the names of approximately two millions of employees. It was the magnitude of the absolute increases rather than the degree of the increase that attracted public attention. In the aggregate the higher wage rates and the more favorable working rules made effective during federal control had the effect of increasing the railroad wage costs at the annual rate of about one billion dollars. The estimate is based upon a comparison of wage earnings at the end of federal control with those of December, 1917; in making it the wage advances of 1918 as well as those of 1919, the effect of the universal application of the eight-hour day, and the added expense of punitive rates for overtime are taken into consideration. During the latter part of 1919 Mr. Hines stated that the wage rates in effect at that time, expressed in average earnings per hour or per day, were approximately 56 per cent greater than those of December, 1917. Between the date of his statement

and the termination of federal control further upward adjustments were made, such as the application of punitive overtime in freight train service and the adoption in the national agreements of many new rules which had the effect of swelling payroll costs. These rules not only increased the compensation to the individual but required the employment of more men for the same amount of work. An indication of the effect of the higher wage rates and changes in rules upon net income is afforded by the relation of total wages to operating revenues. In 1917 labor was paid 43.3 cents out of each dollar of operating revenues. The comparable figure for 1919 was 55.3 cents.[4]

Such exception as may be taken to the labor policy of the Railroad Administration applies particularly to the punitive and restrictive rules in the national agreements, to the extension of the principle of standardization, and to the extreme centralized control of labor relations. The national agreement with the shop crafts was drawn up by a committee of four subordinate officers of the Administration in conference with representatives of the labor organizations.[5] No member of this committee of subordinate officers had had any railroad managerial experience of responsible character. The chairman had once been an enginehouse foreman; one member of the committee was serving the Administration while on leave of absence from his regular duties as president of one of the unions affected by the agreement; the third

4. Table 15, exhibits of Bureau of Railway Economics, presented as evidence before Senate Committee on Interstate Commerce, June 15, 1921. These ratios and the estimate of one billion dollars of aggregate increase in wage payments take no account of the further increase of over $600,000,000 per year awarded by the Railroad Labor Board in May, 1920. In the year 1920 labor was paid 59.9 cents out of each dollar of operating revenues.

5. These agreements were made with labor organizations affiliated with the American Federation of Labor. There were no such agreements with enginemen, firemen, conductors or trainmen.

member had once served as an enginehouse or boiler-shop foreman; the fourth member had once been a locomotive firemen and had served as a local chairman for the fireman's organization on one road. The agreement as tentatively agreed to by this committee and the representatives of the unions was sent to the Director General with the recommendation of the Director of the Division of Operation and was signed by the Director General on September 20, 1919. It should be noted that neither the regional directors nor the federal managers in charge of the respective railroad units had anything to do with the agreement.[6]

The national agreement with the shop crafts was followed by one with maintenance of way employees. It was dated November 22, 1919. The third, with clerks, freight handlers and station employees, was signed on January 1, 1920. The fourth and fifth agreements were with stationary firemen and oilers and with railroad signalmen. They became effective on January 16, 1920, and February 1, 1920, respectively. It will be noted that all of these agreements were made subsequent to May 20, 1919, when the President announced that the roads would be returned to their owners, and three out of the five agreements were entered into when it was known that federal control would terminate within two months. The railroad executives, therefore, had ground for criticizing the Director General for assuming the burdens which these agreements passed on to the railroads while he was unwilling at the same time to assume the responsibility

6. This explanation is given as a partial answer to a question which entered the minds of many persons who read about the questionable features of the agreement in the press reports of the hearings before the Railroad Labor Board during the summer of 1921, when the railroads sought to have these agreements abrogated. Inasmuch as it is generally understood that the Railroad Administration was composed of former railroad officers temporarily serving the government it was natural to ask why these inequitable rules were agreed to in the first place.

for increasing freight and passenger rates so as to meet the additional expenses.[7]

Prior to the events which led up to the passage of the Adamson Act late in 1916, the relations between the railroad managements and their employees on the typical railroad were reasonably harmonious. It is true that these intimate relations had begun to dissolve before the roads were taken by the government. But during the twenty-six months of centralized power over practically everything that had to do with the pay envelope and with working conditions, the control of local officers over their employees was much weakened. While there had been some standardization of wages and working rules in certain classes of service,[8] the policies of standardization in these matters were carried to an extreme degree during the life of the Railroad Administration. Rates of pay and conditions of employment in nearly all classes of service were made uniform in every part of the country. A car inspector in a small town in Florida received the same rate of pay as one who worked in Chicago or St. Paul. A station clerk in a small inland town worked under the same scale as one who had to assume the higher living costs of Boston. The colored women who cleaned cars in the South were awarded the same wages as white men or white women who did similar work in New York or Pittsburgh. If the standards adopted were reasonable for the lower living costs of the South, they could not be reasonable for the northern sections of the coun-

7. The statement has been made privately that these agreements were made to redeem a pledge between the Administration and the unions while the war was in progress. The writer has no personal knowledge as to the ground for the statement, but if true it has an important bearing on the case. The early negotiations looking toward the first agreement were begun many months before the document was finally signed.

8. See article by the present writer on "Standardizing the Wages of Railroad Trainmen" in this Journal, vol. xxv, pp. 139–160; and "The Locomotive Engineers' Arbitration," ibid., vol. xxvii, pp. 263–294.

try, particularly in urban communities where rents, fuel, and other costs of living were much higher. If the standards were reasonably sufficient for northern cities they must have been unreasonably high for the southern states. Yet an inflexible uniformity in wage rates and in rules affecting hours of service or other terms of employment was prescribed for nearly every class of service regardless of differences in going rates, in rates or rules for similar employment in competing industries, in the severity of work, density of traffic, relative degree of experience, and the local purchasing power of the dollar.

In the brief account (in the preceding article) of labor policies during the year 1918 no reference was made to the Boards of Adjustment which were created during the first year of federal control. These boards, three in number, supplemented the work of the Board of Railroad Wages and Working Conditions, and gave effect to understandings reached between the regional directors and the executives of the unions, under which bipartisan boards were to be established to adjust controversies as to discipline, interpretation of rules, or other similar grievances. An unfortunate effect of the centralization of the machinery for determining wage rates and rules and for the adjustment of grievances was that of undermining the influence of the officers in authority locally on the individual roads, and thereby of impairing discipline. Throughout the entire period of federal control there was a growing tendency on the part of employees to disregard their immediate superiors and the federal managers also, and to go to Washington with all sorts of grievances, many of them trivial. Tho a substantial portion of these complaints were decided against the employees, the net effect, particularly during the last fourteen months of federal control, was to reduce

the local officers to mere figureheads in the adjustment of labor differences. According to the rules of procedure each case had first to be presented to the local officers, but generally that was a mere formality incident to the final reference of the case to the centralized boards. The attitude of the employees grew to be that their real friends and the real power were in Washington. The local officers found themselves unable to adjust even minor differences unless the employees' position were conceded in full, and on the part of these officers there grew to be an inclination to let the central administration assume the responsibility which should go with the authority to settle controversies.[9] Under such circumstances it was inevitable that discipline should be impaired and that the morale of the service should suffer.[10]

The year 1918 had been free from railroad strikes. Such was not the case in 1919. The annual report of the Division of Labor for that year lists thirty-three strikes among railroad and express service employees. In addition there were thirteen strikes by marine and water-front employees. While most of the marine and water-front strikes were authorized by the union executives, none of the thirty-three among railroad and express service employees had the sanction of the national leaders. Tho all of the strikes were local in their appli-

9. An examination of the decisions of the Boards of Adjustment indicates a wide variation in the number of cases presented to the Boards by the employees or the management of individual roads. Some roads had but few cases; others had many. It is not possible without an intimate knowledge of the facts to say whether in the first set of cases the freedom from dispute was the result of exceptionally harmonious conditions and disinclination upon the part of employees to appeal, or whether it was the result of weakness on the part of the management in avoiding trouble by conceding practically all claims. In the second set it is not possible to state with assurance whether the many disputes were caused by an exceptional lack of harmony and a disposition upon the part of employees to seek for cases to appeal, or to a narrow or unbending attitude on the part of the management to concede nothing of a controversial nature and to play safe by shifting the responsibility to Washington.

10. This state of affairs was aggravated by the persistent advocacy of the Plumb plan for "democratic control of railroads."

cation, some had far-reaching effects. Most of the trouble was with unskilled workers of the more radical type. The train service brotherhoods were concerned in but one strike, which was called locally in sympathy with striking employees of an interurban electric road. In twenty-four out of the thirty-three cases the trouble arose because shopmen, enginehouse men and car repairers took things into their own hands and disregarded the orders of their national executives.

### III. Relations with State Commissions; Attitude on Rate Adjustments

One of the first important steps taken by Mr. Hines after he became Director General was to divide the Division of Public Service and Accounting into two separate divisions. The late Judge Prouty remained in charge of accounting, and Max Thelen, formerly chairman of the California Railroad Commission and of the National Association of Railroad Commissioners, was appointed Director of Public Service, effective February 1, 1919.

Following a conference between the Railroad Administration and a committee representing the state railroad commissioners the relations between the federal and the state authorities were clarified by the publication of General Order 58, of February 20, 1919, in which the Director General recognized the jurisdiction of the states over railroads under federal control in such matters as spur tracks, railroad crossings, safety appliances, track connections, train service, station facilities, the investigation of accidents, and other matters of local service, safety and equipment. Officers and employees of the Railroad Administration were instructed to coöperate with the state commissions and the Divi-

sions of Traffic and of Public Service were directed to secure the advice and suggestions of the appropriate state commissions before authorizing advances of any importance in rates, interstate as well as intrastate. The fundamental question as to the paramount authority of the federal government was left for determination by the courts.

The publication of General Order 58 did much to mollify the state commissioners. Throughout the remainder of the period of federal control the relations between the Director General and the state regulating authorities were harmonious. Mr. Hines adopted also a policy of seeking the advice and coöperation of the Interstate Commerce Commission. That body had been virtually quiescent during the year 1918, since under the Federal Control Act most of the Commission's powers over rates were delegated to the Director General during the period of federal control.

In addition to these measures, which afforded scope for action on the part of the public regulating authorities, steps were taken by the Railroad Administration which gave shippers a greater voice in the councils of the traffic and operating departments. In 1918 the shippers had a minority representation in the thirty-three freight traffic committees which were created to consider proposals for changes in rates or rules. Early in 1919 the minority representation of industrial traffic managers was increased to equal representation, and the shippers had representatives also on each of the seventy-three terminal committees created by the Administration to regulate terminal operation, car service, and similar matters. The participation of the shippers' traffic experts on these traffic and terminal committees did much to clear up misunderstandings or to clarify the points of difference.

The general upward revision of freight rates in June, 1918, had been accomplished, with few exceptions, by applying a horizontal increase of 25 per cent. It is obvious, therefore, that in the cases wherein certain commercial relationships were based on freight rate differentials *in cents per 100 pounds*, the application of the percentage increase had the effect not only of increasing the rates but also of changing the absolute spread between the related rates. In many cases the shippers were more interested in maintaining the differentials than they were in the absolute rates. Much of the work of the Division of Public Service, the Division of Traffic, and the regional and local committees had to do with readjusting rates and rules so as to restore former relationships. This work began immediately after the general rate increase of June, 1918, but in 1919 it was carried on more intensively. The report of the Division of Traffic for 1919 indicates that subsequent to August 1, 1919, there were 7804 individual changes authorized.[11] Of these rate changes 63 per cent applied to interstate rates and 37 per cent affected intrastate rates. The nature of the changes, in per cent of total, is shown in the following table, taken from the 1919 annual report of the Division of Public Service:

PERCENTAGE OF TOTAL CHANGES IN RATES

| Nature of Change | Interstate | Intrastate |
|---|---|---|
| Reductions | 76% | 88% |
| Advances | 12 | .. |
| Advances and reductions | 7 | 8 |
| Advances to meet decisions of I. C. C. | 5 | .. |
| Correction of errors | .. | 4 |
| Total | 100 | 100 |

11. The report does not specify the closing date of the period to which the statistics apply. Presumably the period was from August 1, 1919, to the date of the report, December 15, 1919.

While there was also some activity on the part of the state commissions and other representatives of the traveling public in the matter of passenger rate adjustments, very little was done to change the minimum flat rate of three cents per mile established by Director General McAdoo in June, 1918. Requests of certain states to have rates higher than three cents per mile reduced to that basis were denied.

The summary of the results for 1918, given in the preceding article,[12] drew attention to the deficit of approximately $245,000,000. The tabulation shows that for Class 1 roads the operating revenues had increased $853,868,213, while the operating expenses had increased $1,130,770,166. It was noted further that if the rate advances of June, 1918, had been made effective on January 1, 1918, the additional revenue, based on the traffic which actually moved during the first five months of the year, would have been $494,000,000. This additional revenue, if it had been available, would have left a surplus of approximately $249,000,000 instead of a deficit.

When Mr. McAdoo appeared before the Senate Committee on Interstate Commerce on January 3, 1919, (a week before his retirement as Director General) he estimated that the results for 1919 would show a surplus. In other words he believed that with the rate increases of June, 1918 in effect throughout the entire year 1919, the net operating income would exceed the guaranteed rentals. In making this estimate he did not anticipate that freight traffic in 1919 would be much smaller than in 1918, nor did he take into account the possibility of further advances in wage rates and further increases in the cost of materials.

When the figures for the early months of 1919 became

12. In this Journal, February, 1921, p. 339.

available they showed startling deficits. The net result (in even figures) for January was a loss of $36,000,000; in February it was $35,000,000; in March it was $25,000,000. During the first six months of the year the net operating income fell short by over $227,000,000 of meeting the guaranteed rentals.[13]

During the early part of 1919 serious consideration was given to the suggestion that there should be a further increase in rates, and the traffic, operating, and accounting divisions made studies which were intended to be the basis for such a general advance. There was a general feeling throughout the Administration that substantial increases would be necessary to enable the government to meet its guaranteed rentals, and that the Director General could not afford to pile up additional millions per month upon the already large deficit.

Mr. Hines gave serious consideration to these suggestions, but refrained from taking action. During the second half of 1919, when it appeared that he did not intend to order the advances, and when the second cycle of wage increases began to show its effect upon operating expenses, the executives of the railroad companies, looking forward to the return of the roads on December 31, 1919, were seriously disturbed. They pressed upon Mr. Hines their view that he should exercise his authority and advance rates, so that the properties would be self-sustaining when they were turned back to private operation.

On October 7, 1919, Mr. Hines announced his definite conclusion that the government should not increase the rates. On October 13 the chairman of the Association of Railway Executives formally protested against the

13. These figures apply to Class I roads. They do not include the smaller roads and the terminal companies, nor do they make any allowances for losses from the operation of the express and Pullman services and the water lines, and the expenses of the central and regional administrative organization.

decision and submitted a resolution adopted by the Association which insisted "that the duty rests upon the Government to restore, on its own initiative and by its own action, the relationship between revenues and expenses which the Government's action in increasing expenses had disturbed, and that appropriate action in this direction is necessary in order to be in conformity with the statement of the President, when the railroads were taken over by the Government, that investors in railroad securities might rest assured that their rights and interests would be as scrupulously looked after by the Government as they would be by the directors of the several railway systems."

In reply to this protest Mr. Hines declined to change his position, which he stated had been taken with the approval of the President. Having decided that it was not in public interest to make an immediate increase in rates for the purpose of increasing the revenues of the Railroad Administration during the remaining months of federal control, Mr. Hines held that a fundamentally wrong conception was involved in the claim that the President ought to exercise the emergency rate-making power for the purpose of deciding as between the railroads and the public what the former should charge and what the latter should pay *after the end of federal control.* He held that the guarantee applied only to the federal control period and he disagreed with the railroad executives that the abnormal increases were peculiar to government operation. In his opinion the increases in expenses would have taken place if the Railroad Administration had not been in existence.

## IV. Upkeep of Physical Property

With his proclamation of December 26, 1917, taking over the railroads the President had issued a statement which explained why the step was necessary and offered certain assurances to the holders of railroad securities. Among these assurances was the promise that he would immediately recommend to Congress the establishment of definite guarantees that the railroad properties should be maintained in as good repair and as complete in equipment as when taken over by the government. The recommendation was made, and it was adopted by Congress as part of Section 1 of the Federal Control Act. The principle, however, was expressed in general terms. The accounting details were left to be worked out later in the contract to be agreed upon by the Director General and the individual railroad companies. There was much discussion on this point between the legal representatives of the Administration and of the railroad companies, and the up-keep section of the standard contract was rewritten several times before an agreement was finally reached. As finally adopted the contract required the Director General to expend for maintenance such sums as would be requisite in order that the properties might be returned to the companies at the end of federal control in substantially as good repair and substantially as complete in equipment as they were on January 1, 1918. As no inspection or appraisal of condition was made when federal control began it was necessary to adopt some accounting expedient to measure the obligation of the government, and the contract contained the proviso "that the annual expenditures and charges for such purposes during the period of federal control on such property, and the fair distribu-

tion thereof over the same, or the payment into funds of an amount equal in the aggregate . . . to the average expenditures and charges for such purposes . . . during the test period [three years ended June 30, 1917] . . . shall be taken as a full compliance with the foregoing covenant. . . . Due allowance shall be made for any difference that may exist between the cost of labor and materials, and between the amount of property taken over, . . . and for any difference in use . . . substantial enough to be considered, so that the result shall be, as nearly as practicable, the same relative amount, character, and durability of physical reparation."

During the year 1918, while the war was in progress, little thought was given to questions of final accounting. The Administration did its best to maintain the properties so that they might function effectively in meeting the demands of war traffic. No limitations as to maintenance expenditures were placed upon the federal managers except those which were caused by shortages in labor and materials. But when the war was over, when it became evident that the railroads would be returned to private operation by the end of 1919, and when the decline in the volume of traffic coupled with additional increases in wages and higher material costs caused alarming deficits in the early months of 1919, the Director General began to give much personal attention to maintenance expenditures. He impressed upon the regional directors and the federal managers the importance of using care to see that the obligations of the government were not exceeded, and effective steps were taken, beginning in May, 1919, to restrict maintenance expenditures to a budget allowance authorized for each road by the engineering staff of the central administration.

Early in the year, and before it was known that a

budget system for maintenance expenditures would be enforced, the federal managers, following the conventional custom, had laid out their programs for the maintenance season according to their conception of the necessities, and most of them had organized their forces. They were, therefore, greatly disturbed when they received instructions, based on the Director General's telegram of May 27 to regional directors, to limit the June maintenance of way expenditures to an amount which would bear the same ratio to operating revenues that such expenditures on each road during the entire three years of the test period bore to the operating revenues of that period. While it was generally understood that the instructions applying only to June expenditures were intended merely as an emergency brake upon expenditures pending a more deliberate determination of the program for the remainder of the year, and while the drastic restrictions applying to June were quickly canceled, the effect was to slow up the maintenance programs until the budget system could be installed, and to disorganize the maintenance forces.[14]

It was apparent that the Director General feared that the natural desire of the federal managers would be to err on the side of liberality in expenditure so that the properties could be put in good condition prior to their return to private management, and that he took a serious view of his responsibility of protecting the government against overexpenditure. He believed that it would be better to lean toward the side of underexpenditure and settle in cash at the end of federal control,

14. "This change in the maintenance of way policy of the Railroad Administration from one of most liberal authority by the individual road to a plan of rigid control of expenditures led to a considerable undercurrent of resentment upon the part of railroad officers, both Federal and corporate, although much of the criticism would have been avoided if the statistical data on maintenance had been compiled soon enough to have permitted the formulation of a maintenance program before the inception of the season's work. Coming in June, at the height of the season, this curtailment was particularly unfortunate." Railway Age, June 2, 1920, vol. 69, p. 58.

placing upon the railroad companies the burden of proving undermaintenance, rather than run the risk of going beyond the obligation of the government and thereby place upon it the burden of proving overexpenditure.

Throughout his entire term of office Director General Hines held to the view and frequently stated that the maintenance expenditures of the Railroad Administration were being made on a scale which would meet the government's obligation under the proviso in the contract based on the test period. It was his belief that at the end of federal control the government would be indebted to some of the carriers for inadequacy in some elements in maintenance and that on the other hand some of the carriers would be indebted to the government for overmaintenance in certain elements. On the whole, he believed that these would about offset each other, and in estimating the net financial result of federal control in his last report to the President he made no allowance for claims for undermaintenance.

An examination of the expenditures during federal control would indicate that Mr. Hines had reason to believe that his position was sound. The average yearly expenditures for maintenance (way, structures and equipment) during the test period were $963,970,719. In 1916 they were $1,742,001,074, and in 1919 they were $1,982,793,296. These figures indicate that the increase in expenditures over the test period was 81 per cent in 1918 and 106 per cent in 1919, an average increase of 93 per cent for the two years. The increase in maintenance of equipment was relatively greater than in maintenance of way — 105 per cent for equipment and 76 per cent for way and structures.[15] No information as to the relative cost of labor and prices of material

15. Based upon statistics compiled by the Operating Statistics Section of the Railroad Administration. The figures apply to all Class I roads.

in the test and control periods has been made public, but it is unlikely that wage rates and material costs combined were more than 93 per cent greater than in the test period.

None the less, the properties were not fully maintained. In the single item of cross ties the average renewals per year in the test period were 83,885,109. The average yearly renewals in 1918 and 1919 were 71,363,083. This does not give a complete picture because in many cases the renewals in 1918–19 were in ties of lower grade than those used in the test period. The average annual renewals in rails during the test period were 2,041,676 tons. The rail renewals in 1918–19 were at the rate of 1,821,561 per year. The ballast renewals in the test period were 17,065,599 cubic yards. The comparable figures for 1918–19 were 16,157,522, but in some cases gravel ballast was used instead of crushed stone.[16] In addition to the inadequacies in the renewals of ties, rail and ballast, there was inadequacy in the maintenance of structures, mainly in painting. These, however, cannot be stated in exact units.

In the case of locomotives the maintenance was fairly adequate, but both freight and passenger cars were in relatively inferior condition when the roads were returned. The failure to keep up freight car repairs may be attributed in greater part to pooling. With respect to passenger cars it was impracticable to release them from service for the usual periodical shop overhauling, because every car was urgently needed in 1918 for the movement of troops from camps to seaboard and in 1919 for the demobilization of the army.

The case of freight cars requires further explanation. Prior to federal control the joint use of freight cars by

16. From evidence prepared by Bureau of Railway Economics for presentation before Senate Committee on Interstate Commerce in hearings on Senate Resolution 23, June 15, 1921.

all roads was governed by the car service and the per diem rules of the American Railway Association and the interchange rules of the Master Car Builders' Association. These rules were entirely suspended or substantially modified during the period of federal control. The car service rules prescribe the manner of joint use; the per diem rules fix the rate of daily rental; and the Master Car Builders' code defines the responsibility for repairs. We are particularly interested in the question of repairs. In brief, the code holds the car owner responsible for repairs made necessary by ordinary wear and tear in service both when the car is at home or on another road. The user of the car is held responsible for repairs made necessary by "unfair" usage, such as that caused by train accidents. The light running repairs required to make good broken or missing parts are made by the road which has the car, when the need of such repairs becomes apparent. The cost of making good ordinary wear and tear is charged to the owner; the cost of repairs occasioned by rough usage is charged to the road responsible for the damage. In the course of time, usually every two or three years, the cumulative effect of wear and tear and accidental damage necessitates a general overhauling of the car. In normal times this is commonly done by the owning road when the car is at home. When a car is on a line other than the owning line the repairs are confined ordinarily to those required to put the car in condition to be sent home in service. The using road naturally restricts its work on cars of other companies to that which is necessary to keep the car in condition for day to day service. This means that the typical road takes care of the running repairs of both its own cars and those of other roads while on its rails, and confines the heavy general repair work to its own cars. Prior to federal control the typical

road had about 60 per cent of its cars at home and 40 per cent were on other lines.

During federal control the principles of unification were applied in a degree which with respect to freight cars caused a virtual disregard of ownership. Under the instructions no distinction was to be made between "home" and "foreign" cars in making repairs. In theory each road was required to regard every car as its own car and to make the needed repairs, both light and general, to the limit of its capacity. In the distribution of cars little effort was made to return them to the owning road. Consequently the percentage of "home" cars on "home" roads was reduced from 60 per cent to from 10 to 20 per cent.

If the instructions which required each road to assume responsibility for the general repairs of all cars on its lines could have been carried out the results would have been more satisfactory. But as each road had difficulty in obtaining labor and materials, it was natural that the heavy repairs were devoted principally to the few home cars that happened to be at home and the work on foreign cars was confined to running repairs or patch work which merely kept the car in condition for day to day service. As the heavier work was neglected it was inevitable that the general condition of cars should suffer. It was inevitable also that the larger proportion of patch work or temporary repairs substituted for the thorogoing general repairs which would have been given by the owners in normal times meant that the total expenditures would not bear the usual relation to the general condition of maintenance. And in addition to this factor, which explains in greater part why freight cars were returned in inferior condition notwithstanding the expenditure of more than twice the maintenance cost of the test period, there was the factor of relative

efficiency of labor. The restrictive rules of the national agreements and the much larger percentage of inexperienced employees had the effect of increasing expenses without increasing output.[17]

## V. Additions and Betterments

The inability of the railroads in 1917 to finance additions to and improvements in facilities and equipment was one of the important reasons for federal control. The Federal Control Act appropriated $500,000,000 as a revolving fund to be used to pay the expenses of the Railroad Administration and to finance additional facilities or equipment required for government operation. The Act provided that these additions and betterments could be ordered when "necessary or desirable for war purposes or in the public interest on or in connection with the property of any carrier." Advances could be made from the revolving fund for all or any part of the expense of such additions or improvements, such advances to be charged against the carrier, to bear interest, and to be repaid so that the government would be fully reimbursed in the final settlement. As an offset to the interest charges on such advances, the Director General was required by the contract to pay interest to the company upon the cost of such work from the date of its completion, in addition to the guaranteed rental. A distinction was made between work required solely for war purposes and therefore of no permanent value to the company, and work which would inure to the permanent benefit of the company. The cost of work re-

17. The factor last mentioned was a main point of difference between the Director General and the railroad companies in coming to an agreement on the terms of the final settlement. It is unnecessary to pursue the point further here. It was in controversy also in connection with the guarantee paid by the government during the first six months under the operation of the Transportation Act of 1920 (March 1 to September 1, 1920). The Interstate Commerce Commission recently decided that the relative efficiency of labor should not be considered in the settlement.

quired solely for war purposes was to be assumed by the government. Tracks or other facilities at military camps are examples.[18]

Relatively little improvement work was in progress when federal control began. That which was under way was continued pending the determination of a policy. A policy was finally announced in General Order 12, dated March 12, 1918. The order provided that improvements and additions should be confined to those which were absolutely necessary for the protection and development of transportation facilities required to meet the then present and prospective needs of the country's business under war conditions. Railroad officers were reminded that projects which might be regarded as meritorious and necessary from the separate viewpoint of a particular road might not be equally meritorious or necessary under government operation while the facilities of all roads were available for common use. The order specified that the construction of new lines or branches or the extension of existing lines should not be undertaken without the approval of the Director General. The same restriction applied to the ordering or construction of new locomotives and cars. Work under way prior to federal control or new work in harmony with the policy outlined above could be continued or undertaken when the capital charges for any one project would not exceed $25,000. All projects to cost in excess of $25,000 were to be referred to the Director General for approval.

During the year 1918 the Administration authorized betterment work which was estimated to require a total charge of over $900,000,000 to capital account. Of this amount $592,000,000 was actually expended. After the signing of the armistice, and when it was apparent that

18. Claims against the government on this account may aggregate $200,000,000. Letter of Director General Davis to House Committee on Appropriations, May 5, 1921.

Congress would tighten up on appropriations for the revolving fund, the program for new work was curtailed. The limit of $25,000 allowable without prior approval was reduced to $1,000. The total authorizations for the capital accounts proportion of betterment work in 1919 were less than one-third of those authorized in 1918. A substantial part of the work begun in 1918, however, was continued, so that the actual charges in 1919 against capital account were $571,000,000. Including similar expenditures made in January and February, 1920, which were about $37,000,000, the total charges to capital account during the entire period of federal control were $1,200,000,000. The details are listed below:

CAPITAL EXPENDITURES DURING FEDERAL CONTROL [19]

| Item | 1918 | 1919 | Two years |
|---|---|---|---|
| Roadway and track | $294,000,000 | $247,000,000 | $541,000,000 |
| Improvements to existing equipment | 19,000,000 | 21,000,000 | 40,000,000 |
| New equipment purchased by R. R. | 161,000,000 | 64,000,000 | 225,000,000 |
| New equipment purchased by R. R. Admin. | 118,000,000 | 239,000,000 | 357,000,000 |
| Total 1918 and 1919 | $592,000,000 | $571,000,000 | $1,163,000,000 |
| Estimated expenditures in January and February, 1920 | | | 37,000,000 |
| Grand total | | | $1,200,000,000 |

In referring these figures in his final report, dated February 25, 1920, Director General Hines states:

During a considerable period immediately preceding Federal control, the railroad companies had cut down the amount of their expenditures for additions and betterments and equipment because of the high prices, difficulty in obtaining deliveries, absence of funds, etc. The Railroad Administration was, of course, not able to make any plans whatever with respect to a program of capital expenditures for either way and structures or equipment for the calendar year

19. Report to President by Director General for fourteen months ended March 1, 1920.

1920; and it is understood that comparatively little has been done in that direction up to the present time by the railroad companies. The result is that at this time very large expenditures are called for on the railroads in the public interests to increase their efficiency and enable them to meet the growing demands for transportation. Unless the railroad companies shall be able to adopt and enforce the important unifications of facilities and equipment and control in the common interest of the handling of the business in times of stress, the available facilities and equipment will turn out to be wholly unequal to the requirements of the public. Even with substantial continuance of all the important methods of unification and common control, the necessity for very large capital expenditures, both of way and structures and for new equipment, will be very great.

## VI. Financial Results of the Entire Period of Federal Control

The financial results of the year 1919 were much more unfavorable than those of 1918. The deficit in 1918 was approximately $245,000,000. For the entire period of federal control, January 1, 1918 to March 1, 1920, the deficit is at least $1,200,000,000. This is the estimate given by Director General Davis (the present incumbent) in his letter of May 5, 1921, to the Chairman of the Committee on Appropriations of the House of Representatives. In April, 1920, shortly after the close of federal control Director General Hines stated that the deficit would be about $900,000,000. This figure, however, failed to include many items which the present Director General has taken into account in his higher estimate. It is quite probable that the final sum will be substantially in excess of Mr. Davis' estimate of $1,200,000,000, if the railroad companies are successful in obtaining recognition of even a small part of the claims which are now pending. In his letter above referred to, Mr. Davis estimates that the claims for undermaintenance alone will probably run from $700,000,000 and $800,000,000, and he adds that "the Railroad Administration records fail to support claims for overmain-

tenance sufficient in amout to offset these amounts, and it is quite evident that some allowance must be made on account of undermaintenance." Up to May 1, 1921, final settlements had been made with but 19 of the 161 Class I roads, and with but 28 out of a total of 284 of the smaller roads and terminal and switching companies. The delay in settlement is mainly the result of differences in viewpoint on the one factor of maintenance and the time taken to prepare the vast amount of accounting detail required by the Administration, or furnished by the railroad companies on their own initiative, in support of their claims.

The details of the estimated deficit of $1,200,000,000 are not available to the writer but some light on individual items may be had from the final report of the Division of Finance, which gave the estimated deficit as $900,478,757. The report is dated May 10, 1920, and gives the following analysis of the Profit and Loss account as of February 29, 1920, when the roads were returned to private operation:

ANALYSIS OF PROFIT AND LOSS ACCOUNT

| | | |
|---|---|---|
| Estimated excess of operating expenses and rentals over operating revenues: | | |
| Class 1 railroads | $677,513,152 | |
| Other privately owned properties | 43,011,129 | |
| Inland waterways | 2,449,739 | |
| Total | $722,974,020 | |
| Expense of central and regional organization | 13,954,980 | |
| Deficit, American Railway Express Company | 38,111,742 | |
| Adjustment of materials and supplies | 85,204,618 | |
| Net interest accruals | 37,558,162 | |
| Non-operating income | .... | $12,336,855 |
| Deductions from gross income | 10,118,034 | |
| Miscellaneous profit and loss items | 4,894,056 | |
| Profit and loss debit balance | .... | 900,478,757 |
| Total | $912,815,612 | $912,815,612 |

In analyzing the causes of the deficit under federal control, Director General Hines in his final report and in other public statements called attention to certain features which he believed should be given consideration. These features may be summarized as follows:

(1) It was not practicable to increase rates immediately when federal control began. The general increases in freight and passenger rates were made effective in June, 1918. The first general increase in wage rates, while announced in May, 1918, was made retroactive to January 1.

(2) During the first six months of 1919 there was an extraordinary slump in traffic.

(3) The coal strike in November and December, 1919, seriously affected revenues, and operating expenses were increased by the higher price of fuel.

Mr. Hines stated that the net operating income of 1918 would have been $494,000,000 greater if it had been practicable to increase rates on January 1, 1918, in the same degree that they were advanced in June. This additional revenue would have brought a surplus of nearly $250,000,000 in 1918, instead of a deficit of an approximately equal amount.

In referring to the disappointing results of 1919, Mr. Hines intimates that the serious decline in business during the first half of the year accounts for practically all of the deficit of $292,500,000 in that period. To the coal strike he attributed the deficit of $114,000,000 in November and December, 1919. He called attention also to the fact that the Federal Control Act required the government to assume two-fifths of the annual standard return as the rental for January and February, 1920, altho the earning capacity in those two months is lower than the average for the year. In the test period the January and February proportions of the yearly

railway operating income ware 6.228 per cent and 5.257 per cent respectively, a total of 11.485 per cent for the two months, whereas the "pro rata for each fractional part of a year of federal control" (required by the Federal Control Act) obligated the Administration to pay 16.667 per cent of the annual rentals. This method of accounting added approximately $49,000,000 to the deficit for January and February, 1920.

It is proper, of course, to give due consideration to all of these adverse factors. At the same time it must be remembered that scarcely any period in railroad operation is free from similar factors which affect net income. The so-called "outlaw strikes" in 1920, for example, account for the larger part of the deficit during the first six months of resumed private operation while the government guarantee was continued.

Mr. Hines quite properly objects to the deficit during the twenty-six months being labeled as the "cost" of federal operation. As was pointed out in reviewing the financial results of the first period of government control, the deficit in that period could have been avoided if the increase in freight and passenger rates had been greater. The larger deficit of the second period could similarly have been met if Mr. Hines had considered it expedient to initiate further rate increases during his régime. As it stands, the loss is borne by the public treasury.

If private operation of railroads had continued during the war, the railroads would have had to assume increases in expenses approximately as great as those assumed by the government. Tho it is probable that the restrictive rules of the national agreements would not have been adopted, a wage scale lower than that of the Railroad Administration could hardly have been maintained without intolerable interference with the move-

ment of troops and war supplies. True, the railroads were turned back with diminished earning power; but it is extremely doubtful whether the security holders would have been in any better position on March 1, 1920, if private operation had continued throughout the war.

## VII. How Far the Policy of Unification Has Proved Permanent

It is not practicable to make a satisfactory appraisal of the economies made possible through the unification policies of the Railroad Administration. These economies were entirely obscured or were offset in whole or in part by other factors which had an overpowering influence upon operating expenses. Among the adverse factors the two of greatest effect were (1) the necessity during the first year of giving primary attention to wartime transportation needs and but secondary consideration to operating costs, and (2) the lower efficiency of labor, especially among the employees with whom the national agreements were made. Further to be considered are the general advances in all wage rates, the general adoption of the eight-hour day in all branches of the service, the greater costs of materials, and the highly unsettled business conditions. Unfortunately there is no known device which if applied to the operating results of the test periods would bring definite results from which the single factor of unification of facilities and equipment could be measured with any approximation of accuracy. The estimates which appear in the annual reports of the Administration are to be viewed with caution, as they tell but part of the story. Undoubtedly the common use of terminals and other facilities by roads which are normally in compe-

tition resulted in savings in operating costs. These, however, under the non-competitive conditions of federal control, were not as important as was the increased capacity which such consolidations made possible when the railroad machine was taxed to its utmost by the demands of war transportation. During the year 1918 the unification policies and the centralized control, backed by patriotic coöperation from the whole organization, made it possible to produce a volume of transportation greater than that produced in 1917 (when all previous records had been broken) and to move the traffic with less congestion and delay. It should be noted, however, that in 1920, particularly during the second half of the year, when the railroads were again under private operation and when the policies of the Railroad Administration were not in effect, the volume of traffic exceeded even that of 1918, and it was moved with a freedom from congestion and delay that compares favorably with the record of the best months of the federal control period.

Since the termination of federal control many of the unification policies of the Railroad Administration have been materially modified or have been entirely abandoned. Many were applicable only to a period in which competition in service was eliminated. The absence of competition in service during federal control was distasteful to the shipping and the traveling public. The prospect of a renewal of competition under the initiative of private operation was one of the most important reasons for the unanimity of the demand on the part of the public for a return to pre-war conditions of transportation service.

For a considerable period before the war, with uniformity of rates and charges, competition had been confined almost entirely to service. The soliciting

forces of competing lines emphasized the superiority of their terminals or the regularity and expedition of their train service. The road which had shown foresight in locating its terminals advantageously, or had foregone a part of its dividends over a series of years so as to improve its facilities and equipment, made the most of these favorable factors in its traffic-soliciting efforts. The road which had inadequate or less accessible terminals, or was otherwise meagerly equipped, was forced to excel in other features of service. In other words, the spur of competition was a helpful tonic which reacted to the benefit of public service.

During federal control, with virtual pooling of facilities wherever practicable, and with complete elimination of competition, the terminals and other facilities of the prudent road were used in common by other roads which had been unable or unwilling to improve their facilities and equipment. Naturally, with the return of competitive conditions of private management the well-managed roads are disinclined to share their advantages with competitors. The year 1920 consequently has witnessed a general reversion to the pre-war status and the abandonment of most of the innovations of the Railroad Administration. A few instances of unification still remain, such as the joint use of the Pennsylvania passenger terminal in New York by the Pennsylvania and the Baltimore & Ohio Railroads. The Transportation Act of 1920 empowers the Interstate Commerce Commission to require the joint or common use of terminals, including main tracks for a reasonable distance outside of the terminals, when such a requirement is believed by the Commission to be in the interest of public service. As yet the Commission has not formally exercised that power. Probably it will not be invoked until the Commission has worked out its recommenda-

tions for the voluntary consolidations provided for in the Act.

Joint use of locomotives has not been continued, altho in some cases during the heavy traffic period of 1920 roads with surplus power rented locomotives to roads which were short. As to freight cars, the per diem rules agreement, the car service rules, and the interchange code of the Master Car Builders' Association have been readopted substantially as they were before federal control. The per diem rate for the use of freight cars has been increased from 60 cents to $1 and the car service rules have been amended in certain particulars, but these amendments do not affect the individuality of ownership and control under normal conditions. The Interstate Commerce Commission, however, has been given greater power (under the Transportation Act) to control the distribution of cars and locomotives when conditions justify the exercise of that power. A Commission on Car Service has been created as a branch of the American Railway Association and has been clothed with certain administrative powers of policing the railroads to see that the car service rules are properly observed.

There is little likelihood that the Railroad Administration standards for locomotives and freight cars will be continued as such, but probably there will hereafter be a closer approximation to uniformity in certain features of design and appurtenances. The individual roads are reverting to the former practice of designing locomotives and freight cars to suit their local needs. The ultimate result will probably be to reduce the number of types of peculiarly local design, and in freight cars particularly there will be further progress toward standardization.

All of the accounting short cuts used by the Railroad

Administration in dividing joint revenues and expenses have been abandoned. The plan for standardizing operating statistics, however, has been perpetuated by the Interstate Commerce Commission. During the year 1920 this plan was continued by the Commission without change; but effective on January 1, 1921, certain modifications were made at the request of the railroad executives with a view to reducing the clerical work required by the original plan.

The right of the shipper under Section 15 of the Act to Regulate Commerce to specify the route over which his shipment should be carried has been restored, but the Interstate Commerce Commission is authorized by the Transportation Act of 1920 to order changes in the routing of traffic when in its opinion a road is unable so to transport the traffic offered to it as properly to serve the public.

Prior to the date of the termination of federal control the railroad companies took steps to reorganize the "off line" soliciting agencies which had been abolished by Director General McAdoo, and on March 1, 1920, or shortly thereafter, practically all of these agencies were again functioning. In discussing this subject in the preceding review of the first year of federal control attention was drawn to the fact that the public did not take kindly to this abridgment in service.

A few of the consolidated ticket offices have been continued. In some cities certain of the roads have withdrawn but the joint offices are being used by the remaining roads. In Chicago, for example, three roads withdrew while nineteen remained. In most cases where the offices were broken up, or where some of the roads withdrew, the action was taken because certain of the roads believed that the joint offices worked against their individual interests under competitive conditions.

Undoubtedly the consolidated ticket office tended to throw a greater number of passengers to the strong lines and correspondingly to reduce the passenger traffic of the weaker roads.

The policy of reducing or eliminating duplicate passenger train service, such as that between Chicago, St. Louis, Omaha, and the Twin Cities was quickly abandoned. With the return to former conditions of competition it was but natural that the service should be restored substantially on a pre-war basis.[20]

The efforts of the Railroad Administration to centralize the purchasing of equipment, rails, ties and other materials and supplies never produced satisfactory results. The Administration itself abridged the scope of the plan in 1919, and it died at the end of federal control.

Advertising for traffic purposes was entirely discontinued during the first year of federal control but was resumed to a limited extent in 1919 with a view of stimulating passenger travel. In 1920, under private operation, advertising was resumed on the former scale.

The permit system for controlling traffic at the source, a plan which had much to do with the prevention of congestion during federal control, has been continued in part, particularly in the field of export traffic. Shipments for export are not accepted unless the shipper can give assurance that ship space will be available at seaboard. The plan works well in preventing an accumulation of cars at water terminals.

On the whole it may be said that nearly all of the innovations of the Railroad Administration were effective only under the non-competitive conditions of federal

20. During the year 1919 the Railroad Administration restored a large part of the passenger train mileage taken off in 1918. Out of the 67,290,482 train miles (per annum) discontinued in 1918, the Administration restored 11,461,758 (per annum) up to June 30, 1919. The reëstablished service included some of the limited trains, such as the Broadway Limited of the Pennsylvania Railroad between New York and Chicago.

control. Most of these innovations brought satisfactory results while the war was in progress, especially in increasing traffic capacity. Most of them worked less satisfactorily in 1919 when the return of the roads to competitive conditions was in sight. Under the free play competition the principles of unification have a much restricted application and in the majority of cases they are not regarded with favor either by the railroads or the public.

## VIII. Conclusion

The main purpose of this article and that preceding has been to outline the events and conditions prior to federal control, to describe the organization and methods of the United States Railroad Administration, and to appraise the results. In concluding our review we may ask several questions which usually have a prominent part in any discussion of nationalization as a possible solution of the railway problem.

The first has to do with labor relations: did government management show a tendency to make undue concessions to labor for political or partisan ends? Here it is difficult to distinguish between policies and actions dictated solely by emergency needs and those which in some degree may have been inspired by political motives. The Administration was committed by the President to a definite policy of keeping labor contented. Under this policy it was necessary to grant wage rates and to concede working rules which under other conditions might be regarded as unreasonably favorable to organized labor. The main purpose of this sympathetic attitude of the Administration toward the aspirations of the leaders of railroad labor was undoubtedly to prevent disputes which would adversely affect transportation

service during the war period and thus bring discredit upon federal management. At the same time it was perfectly natural that the Administration, with an eye to its perpetuation, would on the one hand do everything that properly could be done to foster friendly relations with labor, and on the other hand would avoid doing anything which would antagonize the labor vote. On the whole, it is the writer's opinion that political motives did not have a dominating influence in labor relations. While there is much to support the view of many observers that the Administration did truckle to labor, there is little evidence that this policy was designed to serve political or partisan ends.

The second question is this: was government management used to promote the political fortunes of the party or a party leader? Here again there is difficulty in differentiating between motives. The goal of the Administration was to surpass all records in transportation efficiency. A successful result would be to add directly to the effectiveness of our participation in the world war and to shorten its duration. Indirectly too, it would add to the prestige of the political party and the leaders then in power. While there were indications here and there that the Administration was not unmindful of the political fortunes of the party or its leaders, these considerations were kept in the background and had little or no effect on general policies. As a sidelight on this question, it is pertinent to call attention to the fact that political considerations had nothing whatever to do with the selection of the officers or employees of the Administration. The men were chosen solely on the ground of fitness. No questions were asked as to political affiliations. It was peculiarly a case where the office sought the man.

The third question has to do with the published state-

ments pertaining to transportation achievements and financial results. Was there any tendency to color the operating statistics or to adjust or manipulate the figures in order to improve the showing? Was there any tendency to refrain from facing the real financial situation or to put off the day of reckoning?

So far as the statistics of physical operation were concerned, the Administration's policy was one of publishing and distributing the complete figures month by month in much greater detail than had ever before been attempted. Nothing was held back. The same is true as to the statements of financial results, with the one exception that during the closing months of the federal control period there was a disposition to minimize the extent of the actual deficit by ignoring the element of undermaintenance and other claims against the government. During Mr. McAdoo's term of office there was a disposition to magnify the extent of savings made possible through unified control, and in the latter part of Mr. Hines' term of office there was a tendency to overdo in "explaining away" certain unfavorable features. It was natural enough that the Administration should desire to place the situation before the public in the best possible light. At times the coloring was carried to extremes, but there cannot be the slightest suspicion of deliberate manipulation with intent to deceive.

The fourth question bears upon rates and service. Did the railroad administration adjust or manipulate rates under pressure from individuals and localities, or improperly discriminate in rates or service against individuals or localities? It may be stated with assurance that no such improper discrimination was practiced. Exception might be taken here and there in specific cases, as, for example, to the rate adjustments which favored the Southern ports at the expense of North

Atlantic ports; but the consensus of opinion of disinterested traffic experts is that the Administration's action in that and in other cases was justified from the national viewpoint. On the whole, it is the writer's opinion that an honest effort was made in all adjustments and changes to treat individuals and localities fairly without regard to political effect.

Finally, we may ask ourselves whether our recent experiment in federal control affords an adequate test of the desirability of a permanent policy of public ownership and management. The answer is plainly in the negative. The results in 1918 were favorable. In 1919 they were unfavorable. They were favorable in 1918 because at that time we were actively engaged in war, every influence of patriotism supported the Railroad Administration, and the organization was held at concert pitch by the critical military needs. The unfavorable results in 1919 may be attributed in greater part to the pronounced reaction from war-time strain, to the serious decline in traffic, and to the disintegration of the organization in a too prolonged closing period. No one should question the expediency of the government's action in taking the railroads in the emergency. The centralization of power and the more effective coördination with other branches of the government in the crisis made possible results in the effective utilization of equipment and facilities which would have been much more difficult under private management. But it is not proper to treat that part of the period as the test of what might be expected under normal conditions. As regards the unfavorable year 1919, it would be as unfair to make that a test of government operation as it would be to take the present period of subnormal traffic and disturbed economic conditions as the final test of private management.

Those who advocate nationalization and look upon the results of both years as favorable to government operation must concede that they are to be credited to railroad men who rose to the emergency. The proponents of nationalization who are disappointed in the results of the two years attribute the failures to the fact that the real management during the greater part of federal control was in the hands of men who were brought up under private management and who, therefore, could not or would not avail themselves of the advantages of unification.

It is plain, therefore, that nothing definite can be proved from the results of 1918–19. A real test of government operation is possible only if carried on over a longer period — one in which business conditions are normal and in which political expediency would have normal play. The period under review was so abnormal that the results are valueless as guides to what might be expected from similar control or complete government ownership when normal conditions return.

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# THE TECHNOLOGICAL INTERPRETATION OF HISTORY


## SUMMARY

I. Marx's view of history is technological not economic. — II. The social process according to Marx, 75. — III. Technological changes, the class struggle and human adjustments to environment, 75. — IV. Forces lying back of technological evolution, according to Marx and Engels: extension of markets, development of science, cosmic evolution, 78. — V. The Marxian view against the background of fundamental factors and forces, 80. — VI. Criticism of the Marxian theory, 82. — VII. Conclusion, 83.


## I

It has become the fashion of late to refer to the Marxian interpretation of history as an "economic" interpretation, and to drop the term "materialist" used by Marx and Engels. Indeed one recent writer goes so far as to say that "there is no logical connection either way between .philosophic materialism and what is called the 'materialistic conception of history.' . . . Economic causes operate through men's desire for possessions, and would be supreme, even if desire could not, from a philosophic point of view, be explained in materialistic terms." [1] Thus this so-called economic interpretation becomes at last a psychological interpretation.

Marx and Engels, however, use the term "materialist" in describing their theory. While the writer believes, for reasons that will become apparent later, that this term describes their view more accurately than the term "economic," nevertheless it must be conceded

1. Bertrand Russell, "Bolshevik Theory," New Republic, September 15, 1920.

that it is open to criticism on the ground that it is too broad. There are various materialist interpretations of history — geographic, climatic, and technological. The Marxian interpretation, however, is technological.

The special theory of Marx can best be set forth by quotations from his writings: "It is not the articles made, but *how they are made*, and *by what instruments*, that enables us to distinguish different historical epochs. *Instruments of labor* not only supply a standard of the degree of development to which human labor has attained, but they are also indicators of the social conditions under which that labor is carried on." [2] Speaking of the "*technological* comparison of different epochs of production" he says: "However little our written histories up to this time notice the development of *material production*, which is the basis of all social life, and therefore of all real history, yet prehistoric times have been classified in accordance with the results not of so-called historical, but of materialistic investigation. These periods have been divided, to correspond with the *materials from which their implements and weapons are made*, viz., into the stone, the bronze, and the iron ages." [2] From Engels we have the following: ". . . the whole of history up to the present time is to be regarded as the history of the period extending from the time of the practical discovery of the transformation of mechanical movement into heat to that of the transformation of heat into mechanical movement." [3] Clearly this is technology and not economics.

Marx, it is true, does refer to the economic structure of society as the foundation on which rise legal and political superstructures. But at the base of the economic structure of society he never allows us to lose

2. Capital, Kerr edition, vol. i, p. 200.

3. Engels, Landmarks of Scientific Socialism, translated by Lewis, Kerr edition, pp. 148, 149.

sight of the foundation stones of technology. The economic structure is referred to as "relations of production"; the technological foundation underlying the economic structure is referred to as "methods of production" and "material forces of production." "In the social production which men carry on they enter into definite *relations* that are indispensable and independent of their will; these *relations of production* constitute the economic structure of society — the real foundation, on which rise legal and political superstructures and to which correspond definite forms of social consciousness. The *mode of production* in material life determines the general character of the social, political and spiritual processes of life. . . . At a certain stage of their development the *material forces of production* in society come in conflict with the existing *relations of production*. . . . New higher *relations of production* never appear before the *material conditions* of their existence have matured in the womb of society. . . . In broad outlines we can designate the Asiatic, the ancient, the feudal, and the modern bourgeois *methods of production* as so many epochs in the progress of the *economic formation* of society." [4]

From these quotations it must be clear that, while Marx looks upon the economic structure of society as the basis for the political and intellectual superstructure, he finds the foundation upon which the economic structure is built in technology, in the mechanical modes of production. He distinguishes, in short, between the economic basis of society and the technological basis of society.

4. Marx, Critique of Political Economy, translation by Stone, pp. 11–13.

## II

There are then according to Marx three distinct steps in the social process: (1) changes in the technique of production; (2) changes in the economic structure of society — in the "relations of production," the "property relations" (such as free competition, freedom of enterprise, private property on the one hand; or monopoly, public regulation, public ownership and coöperation on the other); (3) changes in political, social and intellectual institutions. Changes in technique necessarily alter the economic structure of society, which in turn affects government, social institutions, and the controlling ideas of the age.

With Marx, then, the foundation upon which any society is built is the technique of production and transportation. Industrial society is conditioned by this technique. The economic structure of society is the adjustment that human beings in all their economic interrelations have made to the conditions imposed by technology. Political interrelations in turn must conform to the economic structure of society. So also with other social institutions. Thus the superstructure is reared on the basis of the economic structure, which in turn rests on the technique of production. "Man makes his own history, but he does not make it out of whole cloth, he does not make it out of conditions chosen by himself, but out of such as he finds close at hand." [5]

## III

Engels' statement of the theory differs somewhat from that of Marx, but he agrees in his emphasis on the technological basis of society. He defines "historical materialism" as "that view of the course of history

5. Marx, The Eighteenth Brumaire, translated by DeLeon, p. 9.

which seeks the ultimate cause and the great moving power of all important historic events in the economic development of society, in the changes in the *modes of production and exchange*, in the consequent division of society into distinct classes, and in the struggle of these classes against one another." [6] "From this point of view the final causes of all social changes and political revolutions are to be sought, not in men's brains, not in man's better insight into eternal truth and justice, but in the *changes in the modes of production and exchange*. . . . From this it also follows that the means of getting rid of the incongruities that have been brought to light must also be present, in a more or less developed condition, within the changed *modes of production* themselves. These means are not to be invented by deduction from fundamental principles, but are to be discovered in the stubborn facts of the existing *system of production*." [7]

Engels' statement of the theory may be summarized as follows: (1) changes in the modes of production and exchange; (2) the consequent formation of new class alignments; (3) class conflicts growing out of this new alignment; (4) reconstruction of economic, social, political and intellectual institutions.

The fundamental difference between the Engels' version and the Marxian lies in the emphasis that Engels places on class alignments and class conflicts. In his introduction to the Communist Manifesto he tells us that "the whole history of mankind has been a history of class struggles." Marx places the matter on a broader basis. With him the technical changes in the modes of production necessitate new human and social adjustments to the changed technological environment. True, so far as changes in the economic and political institu-

6. Engels, Socialism, Utopian and Scientific, Kerr edition, p. 23.
7. Ibid., pp. 94, 95.

tions of society are concerned, such adjustments constitute an effort on the part of society as a whole to come to terms with the new technological conditions. And since any adjustment on the part of society as a whole to new situations involves injury and suffering for some groups, and benefit and progress for others, the necessary result is a struggle arising out of opposing class interests. All adjustments involving social interrelations must result in conflict. But many adjustments do not involve complex interrelations. For example take Marx's discussion of the effect of capitalism on parental exploitation of children. Marx tells us that "it was the capitalistic mode of exploitation which, by sweeping away the economical basis of parental authority, made its exercise degenerate into a mischievous misuse of power." [8] Clearly the class struggle had no part in the adjustment of family conditions to the factory system of production. Another example would be the effect of modern industrialism on Sunday observance and religious belief. On the other hand Marx points out that a person's intellectual outlook and ideals, tho the individual himself may be unaware of it, are frequently a product of class antagonisms based on a clash of economic interests. "Upon the several forms of property, upon the social conditions of existence, a whole superstructure is reared of various and peculiarly shaped feelings, illusions, habits of thought and conceptions of life. The whole class produces and shapes these out of its material foundation and out of the corresponding social conditions. The individual units to whom they flow through tradition and education, may fancy that they constitute the true reasons for and premises of his conduct." [9]

8. Capital, Kerr edition, vol. i, p. 536.

9. Marx, The Eighteenth Brumaire, translated by DeLeon, p. 48.

## IV

Social dynamics then go back ultimately, according to Marx and Engels, to changes in the modes of production. But, one may ask, what brings about these changes in the modes of production? In the Communist Manifesto, Marx and Engels sought to explain how changes in the modes of production brought on the downfall of feudalism. What brought on these changes in technique which felled feudalism? It was the widening of the market. "The East Indian and Chinese markets, the colonization of America, trade with the colonies, the increase in the means of exchange and in commodities generally, gave to commerce, to navigation, to industry an impetus never before known. . . . The feudal system of industry, under which industrial production was monopolized by close guilds now no longer sufficed for the growing wants of the new markets. The manufacturing system took its place. . . . Meantime the markets kept ever growing, the demand ever rising. Even manufacturing no longer sufficed. Thereupon, steam and machinery revolutionized industrial production. The place of manufacture was taken by the giant, Modern Industry. . . ."

This still leaves us hanging in mid-air. What were the factors which brought on the widened market? The answer of the Communist Manifesto is: "The discovery of America, the rounding of the Cape. . . ." In short, the development of the science of navigation. And back of this scientific development lies the quest for treasure, land and livelihood. Engels expressed the causal relation as follows: "Although technique is mainly dependent on the condition of science, it is still more true that science depends on the condition and needs of technique. A technical want felt by society is more of an impetus to

science than ten universities." [10] So Engels solved the riddle by arguing in a circle: technique depends on science, and science depends on technique. By implication, however, one would infer that possibly "ten universities," interested in research for its own sake, might contribute something to science independently of the impetus of the needs of technique.

But of course Marx and Engels did go back to more fundamental ultimates than those so far enumerated. They were philosophical materialists. They write: "It is impossible to separate thought from matter that thinks. This matter is the substratum of all changes going on in the world."[11] From Marx we have the following: "I was led by my studies to the conclusion that legal relations as well as forms of state could neither be understood by themselves, nor explained by the so-called general progress of the human mind, but that they are rooted in the material conditions of life. . . ."[12] One has only to read Engels' *Landmarks of Scientific Socialism* to realize that he seeks for ultimate causes in the forces inherent in cosmic evolution. Physical evolution is there surveyed in terms of Kant's nebular theory; organic evolution in terms of Darwinism.

Why then are changes in the modes of production and exchange referred to as the "ultimate cause" of historic events? Because Marx and Engels are trying to lay bare only the dynamics of human history. They are not seeking to discover causal relations in the universe as a whole. They are seeking to explain the social process. So far as human society goes they conceive that they have reached ultimate fundamentals when they

10. Engels, letter of 1894 in Der Sozialistische Akademiker, quoted in Seligman, Economic Interpretation of History, p. 59.

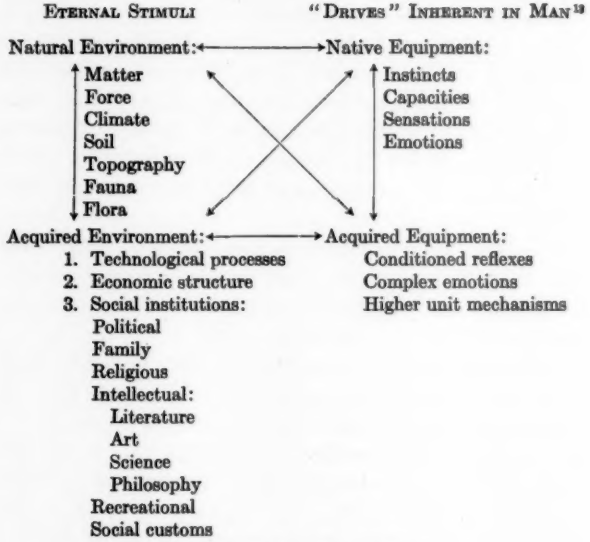
11. Marx and Engels, Die Heilige Familie, quoted in Engels, Socialism, Utopian and Scientific, Kerr edition, p. 16.

12. Marx, Critique of Political Economy, translation by Stone, p. 11.

have found the basis upon which social institutions rest. For them all social institutions are human adjustments to the prevailing technique of production. With the underlying causes for the changes in technique they are in the main not concerned. Whatever may be the reasons for these changes, all the institutions of society — economic, political, social, intellectual—are the results of the efforts of conscious, struggling human beings to adjust their social relations to their technical environment.

## V

The accompanying diagram may help to place the Marxian theory against the broader background of fundamental factors and forces. We start with Man and Nature. Nature furnishes the natural environment




13. Cf. Woodworth, Dynamic Psychology.

which acts selectively upon human heredity resulting in races of men equipped with native instincts and capacities, sensations and emotions adapted to the selective environment. The natural environment also offers stimuli, evoking responses in the native equipment of man. This native equipment has survived because it constitutes a workable adjustment to nature. Different adjustments might no doubt have been possible, but through the trial and error method of nature certain types of human equipments have survived. Nature thus affects Man. But this is quite a different thing from contending, as would philosophical materialism, that you can explain Man in terms of Nature.

It is not necessary to go into detail regarding the causal interrelations of native equipment, acquired equipment, natural environment and acquired environment. A little reflection will soon convince one that the causal relation works both ways between any one of them and each of the other three. For our purposes it is sufficient to point out that Marx and Engels were concerned only with an explanation of social institutions and the law of social dynamics. As philosophical materialists, it is true, they have always as a background for their thinking the imminent forces of cosmic evolution. These forces expressing themselves through Man and Nature bring on changes in the technique of production. These changes serve as their starting point in explaining history. For them there is but one active, dynamic institution in society — the technical modes of production. All other institutions of society are conceived as passive. They would never change were it not for changes in the modes of production. An analogy may be found in Fisher's equation of exchange. Fisher conceives of M and T as active, dynamic factors; V, M′, V′ and P are passive factors which change as M or T changes.

## VI

Enough has been said to show the severe limitations of the Marxian theory. They may be summarized as follows:

1. The theory starts with changes in the technological processes. It does not reach back to the ultimate forces in life — the "drives" inherent in the native instincts and capacities, sensations and emotions, in the acquired equipment of man, and the "stimuli" afforded by the natural environment. Here are to be sought the real wellsprings of individual and social life.

2. The theory assumes that the one external condition to which man must make new adaptations in his social institutions is the technique of production. The assumption is not true. Changes in the natural environment, in climate and geography for example, profoundly alter the face of civilization, as Huntington has so ably shown. No doubt these changes work out their influence to a considerable extent through resulting changes in the modes of production, but not exclusively so.

3. The theory assumes that if no changes took place in the modes of production, social institutions would not change. The mere statement of this view of history shows how extremely mechanical it is. It completely overlooks the instinct of contrivance and invention, the constant effort of human beings through trial and error to find improved adaptations to their environment. Even tho man's environment never changed, social institutions would still change because of man's constant effort to find better adaptations to that environment.

4. The theory assumes that all social institutions are adaptations to external environment. It overlooks the fact that social institutions are also adaptations to the instincts, capacities and emotions inherent in man him-

self. Hence even tho no changes took place in the modes of production man would still seek to contrive superior forms of self-expression. Changes would thus take place, especially in religious, intellectual, and recreational institutions.

5. The theory assumes that but one single adaptation to given conditions is possible. "In the social production which men carry on they enter into definite relations that are *indispensable* and *independent of their will.*" Hence the dogma of the inevitableness of socialism. But in reality the whole history of man is an application of the method of trial and error. The very fact that we are constantly trying out various solutions, none of which are perfect, indicates that there is no one single solution.

## VII

Human beings are phlegmatic. Tradition and inertia are strong. Social institutions change slowly, for the simple reason that any change must get the support of the existing dominant social forces, or else the balance of power must be shifted. Hence, as a rule, social institutions are not changed until some powerful force comes along to pry them loose. The Marxian theory is a brilliant recognition of this fact. In modern times at any rate technological changes are taking place with astonishing rapidity. New social adjustments must necessarily follow. Profound technological changes compel attention to economic problems.

Modern social dynamics cannot be understood without searching out the effect of technology on civilization. It is one thing, however, to search out the influence of a single factor, and quite a different thing to refuse to seek out the influence of other factors. A useful tool need not be made a dogma.

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# A STATISTICAL TEST OF THE SUCCESS OF CONSOLIDATIONS

## SUMMARY

Nature of the study, 84. — Underlying assumptions of the study, 86. — I. Previous earnings of the representative consolidation compared with actual earnings, 90. — II. Estimated earnings of the representative consolidation compared with actual earnings, 91. — III. First-year earnings of the representative consolidation compared with later earnings, 93. — Table of fundamental data, 95.

STATEMENTS concerning the advantages or disadvantages of large scale enterprises brought about through combination — the so-called "trusts" — are ordinarily based on certain theoretical assumptions. These *a priori* assumptions have emphasized the various economies and various wastes which are alleged to accompany consolidation. No attempt, however, has been made to apply specific and definable tests to a sufficiently large collection of actual cases to justify generalizations possessing empirical value.[1] To do this is the purpose of the present study. The consolidations here under review were for the most part organized before 1903. A period of at least ten years elapsed, therefore, between their organization and the economic disturbances caused by the Great War. The period affords ample opportunity to judge of the ultimate success or failure of the trusts, since in that time they should have been able to prove the economic advantages of consolidation.

1. A preliminary study of this kind, using fewer corporations and less critical methods, was undertaken by me in another connection. See my Financial Policy of Corporations, vol. iii, p. 221.

The specific problem whether or not large combinations of units of production are successful is divisible into two parts: the definition of success and its specific application to the trusts. In order that our study may have an objective standard we must establish some clearly describable criterion of success; and we must be able to apply it to a sufficiently large group of trusts to give the results at least some semblance of inductive value.

The term success when applied to a business may mean a variety of things. A successful business may be one which is conducted so economically that the commodities it deals in reach the ultimate consumer at a low price relative to the competitive cost of production. It may be one that endures through a long period of time. It may be one that grows in mere size without reference to the relative yield to invested capital or to business ability. And finally it may mean — in fact usually does — a business that yields a relatively large profit to the managers. In the end all these usages are reducible to the last. A business cannot long produce or distribute commodities to the consumers at a relatively low price unless it yields a profit to its managers; it cannot long endure unless the activities of a manager are stimulated by liberal profits; it cannot increase in mere size unless the profit is sufficient to encourage the continuous investment of capital. It is difficult, however, to determine that amount of true profit or of return on invested capital which marks the line between success and failure. Both profit and success are relative terms. But they are relative to what?

In this study three separate standards of relative profit or relative success are used. I shall assume that an industrial combination, in order to be called successful, should yield a larger net profit than the sum of

the net profits of the component elements that entered the combination. This is our first criterion. A second assumption will be that the combination should yield a net profit at least approximately equal to what its proponents, including its bankers, owners, and promoters, estimated that it would yield. And lastly it must be assumed that the average net earnings over a considerable period of time — say ten years — should show a conspicuous increase over the net earnings prior to the combination and during its first year. In other words, there must be a sustained increase. The application of these tests to industrial combinations in general is not as simple as their mere formulation. Something of a more or less arbitrary procedure has to be adopted, involving certain further assumptions. These will be explained in detail as we proceed.

A random selection of thirty-five industrial combinations was chosen which met the following six conditions. In order to qualify for the group the combination must (1) have been in existence at least ten years before 1914, (2) must have been formed as a combination of at least five separate, independent and competing plants, (3) must have a national rather than a mere sectional or local significance, (4) must have published financial reports in which at least some degree of confidence can be placed, (5) must have available published or accessible reports covering the earnings of the separate plants prior to their consolidation and the estimates of earnings made at the time the combination was effected. Lastly, the group as a whole must represent a wide diversity of industries.

A period of ten years was selected as sufficient to enable the "trust" to develop its weaknesses and its strengths; and cases were omitted from the tabulation when this period extended beyond 1914, since extra-

ordinary profits or extraordinary losses due to the Great War might vitiate the calculation. Again, every effort was made to exclude from consideration all corporations not industrial combinations, strictly speaking. This was done by refusing to consider a business organization as an industrial consolidation unless it represented, at the time of its organization, at least five separate and relatively independent units, all previously competitors of each other. This eliminated from consideration large businesses arising from internal growth, with now and then a sporadic addition from the outside, and those businesses arising from the union of only two or three relatively large units. Such combinations should be considered business expansions rather than industrial consolidations. All purely local combinations having only a local market for their products and only a narrow and restricted market for their securities were left out of account. Furthermore, in order to be included in the group a corporation must have available reliable published reports, covering a period of ten years. These reports must be of such character that the annual earning statements can be reduced to something like a uniform basis.[2] Even with the published reports available it was difficult to standardize the accounts; the necessary assumptions and interpretations will be described under the appropriate headings. Lastly, considerable effort was made to obtain a wide distribution of corporations, in order to ensure representation of many different industries. Aside from the purpose to secure such a wide distribution no effort whatever was made to include corporations known to be either successful or unsuccessful — either those which have attained an in-

2. The American Window Glass Company — of which more will be said from time to time — is included notwthstanding the fact that its published reports are inadequate for our purpose. It was included in order that there should be at least one combination allied to the building trades.

vestment standing or those which became bankrupt. It will be observed that the list includes some consolidations, like the United States Envelope Company, which have been conspicuous in their able management and their steadily maintained success, and some others, like the American Window Glass Company, which have been equally conspicuous failures. The majority of the corporations, however, are those reported to have attained a modicum of success.

In preparing the tables the most difficult problem was that of reducing the statements of the different corporations to a uniform basis. It was, in fact, the problem of establishing a uniform system for the accounting of net profits. Owing to the meager data ordinarily furnished by the different corporations, especially those obviously unsuccessful, results were obtainable only by using a large amount of guessing. The statements of the previous earnings were, almost invariably, taken from the published reports of accountants, chosen in the majority of cases by the bankers who underwrote the original security issues at the time of promotion. All estimates or predictions of earnings were, except in the cases explained in footnotes, taken from published statements issued by the bankers or the promoters at the time of promotion. Where more than one prediction was made, the lowest and least extravagant statement was used. A few instances were found of estimates of earnings so extravagant and unreasonable that one is reminded of Johnson's phrase about wealth beyond the dreams of avarice. Such cases were disregarded altogether, even tho they illustrate the extravagant expectations nurtured by some of the trust promotors. And the fact that the most extravagant predictions were often made in connection with consolidations which later proved utter failures, while not pertinent to the

present study, is yet suggestive of the prevailing conception of profits expected through industrial consolidation. The earnings of the first year, as was true of the earnings for the later years, represent the net earnings after taxes and depreciation but before the payment of any interest or dividends. It was generally difficult and sometimes impossible to determine whether or not the company had charged its published net earnings with a reserve for depreciation. When no information of this character was available, the benefit of the doubt was given to the company; that is, it was assumed that the company made proper depreciation charges. In fact, in all cases of uncertainty in the computation of the net earnings the more liberal interpretation was adopted, so that the company was placed in the most advantageous light. The calculation of the average earnings for the first ten years presented no serious problem, except when the date of the beginning of the fiscal year was changed. In such cases the full twelve-month period was computed by a species of dead reckoning. Attention is called to the detailed descriptive notes, indicating the sources of figures and the method of compilation in cases involving some uncertainty. Where there is no reference the figures are taken directly from the annual reports of the corporation.

Table I gives the primary material on which all the others are based. Deductions from it will be discussed, in connection with the subsequent tables, under three headings: (1) the previous earnings of the separate plants before consolidation in comparison with the earnings after consolidation; (2) the estimated earnings at the time of consolidation in comparison with the earnings after consolidation; and (3) the earnings during the first year in comparison with the earnings during a period of years.

The figures in the tables that follow (Tables II to V) are in the nature of index numbers, being ratios expressed on a basis of 100 between the different figures for each of the thirty-five corporations. The medians of each group of thirty-five were computed from these ratios. Certain ratios could not be determined as real integers, because one of the terms was a negative quantity. Other ratios at the extremes of the arrays were very large. For these reasons an inclusive arithmetical average of the entire group of thirty-five ratios would be meaningless. Accordingly averages were computed of the twenty-one ratios lying between and including the quartiles. Owing to the relatively close dispersion in most cases on either side of the median these averages are perhaps more significant than the medians themselves. The closeness with which they approximate the medians should be noted in estimating the statistical value of the general conclusions.

## I. Previous Earnings before Consolidation Compared with the Actual Earnings Realized

From Table II it will be observed that the aggregate earnings of the separate competing establishments prior to consolidation were seven-tenths of the earnings estimated to follow consolidation. Roughly, the promotors of the consolidations believed that the mere act of combination would increase the earnings by about a half. But in actual results the earnings before the consolidation were nearly a fifth *greater* (18%) than the earnings of the first year after consolidation. (See also Table V.) The promotors expected the earnings to be a half greater than the aggregate of the competing plants; instead they were about a fifth less. Nor were the sus-

tained earnings an improvement, for the earnings before the consolidation were between a fifth and a sixth greater than the average for the ten years following the consolidation. In brief, the earnings of the separate plants before consolidation were greater than the earnings of the same plants after consolidation.

## II. Estimated Earnings at Time of Consolidation Compared with the Actual Earnings Realized (See Tables III and IV)

The estimated probable earnings made by the promotors at the time the trusts were organized can be reached by two lines of evidence — the prophecies of the promotors themselves and the patterns according to which they cut the financial plans of the embryo corporations. The former we can consider the direct line of evidence, the latter the indirect line.

When we compare the estimates of the promotors covering the earnings of the new corporations with the earnings actually realized, some striking results are apparent. See Table III.

So confident were the promotors and bankers of the success of the trusts that they estimated the earnings resulting from consolidation to be a little over a third greater than the earnings of the separate plants before consolidation. On the basis of this estimate they considered themselves safe in making the sum of the fixed charges on the bonds and the dividends on the preferred stock to be less than a half of the estimated earnings. This conservative procedure would have worked well in practice, provided the actual earnings following consolidation had even approximated the estimates made by the promotors. But they did not. The estimated earnings were half again as large as the actual earnings of

the first year after the union, and nearly twice as great (175%) as the average earnings during the ten-year period following consolidation. The divergence between the estimates and the actual results is even more apparent when we observe that in only four out of the thirty-five cases did the earnings during the year following consolidation equal or exceed the estimates made by the promotors; and in only five cases — one-seventh of the total — did the average earnings for the ten-year period following consolidation equal or exceed the estimates made by the promotors and bankers at the time the trust was organized.

This conclusion is indirectly shown by the relative load of fixed charges and contingent preferred stock dividends placed upon the trusts at the time of consolidation. It is a well known and thoroly established principle of financial practice that the fixed interest charges and contingent preferred stock dividends of industrial or manufacturing corporations should not be more than half the net earnings, after reasonable, but not extraordinary, allowances have been made for depreciation and obsolescence. In the case of these industrial combinations it amounted to nearly three-fourths of the net earnings of the first year and the tenth year, and nine-tenths (90% average between quartiles) of the average earnings of the ten-year period after consolidation. See Table IV.

### III. Comparison of the Earnings of Industrial Consolidations Immediately After Consolidation with Later Earnings

The ratios given in Table V are intended to compare the earnings of each industrial consolidation during the first full year of its existence with the earnings before consolidation and with the earnings after the trust has been fully established.

The later earnings, however, should be subject to some adjustment. In almost every case new capital was invested by the managers of the consolidation in betterments and improved equipment, not properly chargeable to depreciation and reasonable obsolescence. In some cases, like the acquisition of the Tennessee Coal and Iron Company by the United States Steel or of the Guggenheim plants by the International Steam Pump, whole units were added to the aggregate of property already owned by the trust at the time of its organization. The betterments and the new plants added materially to the net earnings of the combination, or should have done so provided the promise of increased earnings through enlarged scale of production was fulfilled. Strict accounting would require that the average net earnings for the ten-year period and the net earnings for the tenth year should be reduced by amounts corresponding to the presumptive earnings of the added capital before these earnings were compared with the earlier earnings. However, such adjustments to the reported net earnings because of actual additions to property would be very difficult to make and controversial at best. Accordingly no such adjustments were made, so that the figures for the ten-year average and of the tenth-year earnings are greater than

those of the groups of plants entering the consolidation or contributing to the earnings of the first year.

The representative earnings of consolidation during the first year were less, by about a tenth, than the average earnings during the ten-year period. The ten-year period began, in twenty cases out of the thirty-five, in 1900; it included, therefore, quite as many years of marked business activity as of marked business depression. The earnings of the first year after consolidation were greater — by a little less than a tenth (7%) — than the earnings of the tenth year. In other words, after sufficient time had elapsed to permit the consolidation to perfect its organization, to reconstruct its plants and to effect all the anticipated economies of combination and large-scale production, and after considerable sums of new money had been invested in betterments and new plants, the earnings gradually diminished until they were no more, perhaps a little less, than during the first year of consolidation. And the first-year earnings, as has been shown already, were less than the earnings of the separate plants before consolidation.

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TABLE I. — FUNDAMENTAL DATA

| | Name | Date incorporated | Bonds issued at incorporation | Preferred stock | Preferred stock dividend | Fixed charges |
|---|---|---|---|---|---|---|
| 1 | U. S. Leather | 1893 | $6,000,000 | $62,282,300 | 8 c[3] | $360,000 |
| 2 | Am. Matting | 1897 | none | 2,500,000 | 7 c | none |
| 3 | Am. Linseed | 1898 | none | 16,750,000 | 7 n | none |
| 4 | U. S. Envelope | 1898 | 2,000,000 | 3,750,000 | 7 c | 120,000 |
| 5 | Inter. Paper | 1898 | 8,699,000 | 20,530,700 | 7 c | 521,940 |
| 6 | Am. Agri. Chem. | 1899 | none | 17,000,000 | 6 c | none |
| 7 | Am. Beet Sugar | 1899 | none | 4,000,000 | 6 n | none |
| 8 | Am. Car and Foundry | 1899 | none | 30,000,000 | 7 n | none |
| 9 | Am. Cement | 1899 | 930,000 | none | none | 46,500 |
| 10 | Am. Chicle | 1899 | none | 3,000,000 | 6 c | none |
| 11 | Am. Hide and Leather | 1899 | 8,445,00 | 13,000,000 | 7 c | 506,700 |
| 12 | Am. Pneu. Tube Service | 1899 | none | 5,000,000 | 6 n | none |
| 13 | Am. Window Glass | 1899 | none | 4,000,000 | 7 c | none |
| 14 | Am. Woolen | 1899 | none | 16,000,000 | 7 c | none |
| 15 | Am. Writing Paper | 1899 | 17,000,000 | 12,500,000 | 7 c | 850,000 |
| 16 | Inter. Steam Pump | 1899 | none | 8,850,000 | 6 c | none |
| 17 | Natl. Enam. and Stamp | 1899 | none | 7,375,000 | 7 c | none |
| 18 | Natl. Salt | 1899 | none | 5,000,000 | 7 c | none |
| 19 | N. E. Cotton Yarn | 1899 | 5,591,000 | 5,000,000 | 7 c | 279,553 |
| 20 | Pittsburgh Coal | 1899 | none | 32,000,000 | 7 c | none |
| 21 | Pressed Steel Car | 1899 | none | 12,500,000 | 7 c | none |
| 22 | Republic Iron and Steel | 1899 | none | 25,000,000 | 7 c | none |
| 23 | Rubber Goods Mfg. | 1899 | none | 6,196,000 | 7 c | none |
| 24 | Sloss-Sheffield | 1899 | 3,835,000 | 6,700,000 | 7 n | 202,575 |
| 25 | Univ. Bag and Paper | 1899 | none | 11,000,000 | 7 c | none |
| 26 | Crucible Steel | 1900 | none | 25,000,000 | 7 c | none |
| 27 | Standard Milling | 1900 | 5,750,000 | 6,900,000 | 6 n | 287,500 |
| 28 | Allis Chalmers | 1901 | none | 25,000,000 | 7 c | none |
| 29 | Am. Locomotive | 1901 | none | 25,000,000 | 7 c | none |
| 30 | Quaker Oats | 1901 | 1,600,000 | 7,500,000 | 6 c | 80,000 |
| 31 | U. S. Steel | 1901 | 304,000,000 | 425,000,000 | 7 c | 15,200,000 |
| 32 | Harbison Walker Refractories | 1902 | 3,500,000 | 8,000,000 | 6 c | 175,000 |
| 33 | Natl. Candy | 1902 | none | 2,200,000 | 7 c | none |
| 34 | Inter. Merc. Marine | 1902 | 68,000,000 | 54,600,000 | 6 n | 3,140,000 |
| 35 | United Box Board and Paper | 1902 | 3,873,000 | 14,948,900 | 7 c | 197,380 |

3. Under table of preferred stock dividend "c" denotes cumulative dividends and "n" denotes non-cumulative dividends.

TABLE I. — FUNDAMENTAL DATA (*continued*)

| | Contingent charges (preferred dividends) | Previous earnings | Estimated earnings | Fixed and contingent charges | First year | Tenth year | Average for ten years |
|---|---|---|---|---|---|---|---|
| 1 | $4,982,184 | $4,800,000[1a] | $4,900,000[1b] | $5,342,584 | $1,340,494[1c] | $4,784,997 | $3,753,839[1d] |
| 2 | 175,000 | 1,300,000[2a] | 2,300,000[2b] | 175,000 | 225,000[2c] | −157,503 | 393,117[2d] |
| 3 | 1,172,500 | 1,094,374[3a] | 1,800,000[3b] | 1,172,000 | −1,083,858[3c] | 166,538 | 113,200[3d] |
| 4 | 262,500 | 428,848[4a] | 828,848[4b] | 382,500 | 457,523 | 573,557 | 497,375 |
| 5 | 1,437,149 | 4,100,000[5a] | 5,600,000[5b] | 1,959,089 | 2,845,035 | 1,635,918 | 2,393,172 |
| 6 | 1,020,000 | 1,419,879[6a] | 2,040,000[6b] | 1,200,000 | 1,615,594[6c] | 2,394,498 | 1,680,238 |
| 7 | 240,000 | 428,045[7a] | 1,248,000[7b] | 240,000 | 240,359[7c] | 1,470,611 | 612,313 |
| 8 | 2,100,000 | 2,900,000[8a] | 4,000,000[8b] | 2,100,000 | 4,915,671[8c] | 2,895,831 | 5,050,963 |
| 9 | none | 323,000[9a] | 350,000[9b] | 46,500 | 250,619[9c] | 152,352 | 278,480 |
| 10 | 180,000 | 560,000[10a] | 540,000[10b] | 180,000 | 688,510[10c] | 1,530,000 | 1,199,896 |
| 11 | 910,000 | 1,585,748[11a] | 2,750,000[11b] | 1,416,700 | 926,582[11c] | 2,085,996 | 1,024,938[11d] |
| 12 | 300,000 | 281,449[12a] | 381,449[12b] | 300,000 | 288,616 | 144,959 | 162,316 |
| 13 | 280,000 | 1,466,182[13a] | 2,500,000[13b] | 280,000 | 373,357 | −556,718[13d] | −13,638[13d] |
| 14 | 1,120,000 | 2,593,000[14a] | 3,000,000[14b] | 1,120,000 | 3,287,006 | 4,179,522 | 2,808,783 |
| 15 | 875,000 | 1,250,620[15a] | 2,200,000[15b] | 1,725,000 | 837,997[15c] | 1,410,841 | 1,172,863 |
| 16 | 531,000 | 1,317,791[16a] | 2,500,000[16b] | 531,000 | 1,813,907 | 1,447,653 | 1,671,440 |
| 17 | 516,250 | 1,073,000[17a] | 1,589,250[17b] | 516,250 | 1,442,589[17c] | 924,596 | 1,198,555 |
| 18 | 350,000 | 450,000[18a] | 600,000[18b] | 350,000 | 478,145 | 547,198 | 680,336 |
| 19 | 350,000 | 1,106,197[19a] | 1,600,000[19b] | 629,550 | 1,086,500[19c] | 355,602 | 721,595[19d] |
| 20 | 2,240,000 | 4,078,274[20a] | 5,414,089[20b] | 2,240,000 | 3,181,568[20c] | 1,822,557 | 3,388,080 |
| 21 | 875,000 | 1,500,000[21a] | 3,000,000[21b] | 875,000 | 2,237,000 | 155,478 | 1,875,849 |
| 22 | 2,750,000 | 2,679,000[22a] | 3,445,000[22b] | 1,750,000 | 3,643,729 | 1,629,346 | 2,013,055 |
| 23 | 433,762 | 1,177,228[23a] | 1,200,000[23b] | 433,762 | 629,821[23c] | 2,369,972 | 1,076,308 |
| 24 | 469,000 | 1,355,000[24a] | 2,380,000[24b] | 671,575 | 1,100,424[24c] | 1,336,947 | 1,237,965 |
| 25 | 770,000 | 1,226,000[25a] | 1,562,000[25b] | 770,000 | 1,494,169 | 956,920 | 964,540 |
| 26 | 1,750,000 | 4,000,000[26a] | 4,000,000[26b] | 1,750,000 | 3,250,429[26c] | 3,523,402 | 1,876,704 |
| 27 | 345,000 | 922,873[27a] | 1,172,873[27b] | 632,500 | 605,948[27c] | 766,737 | 660,006 |
| 28 | 1,750,000 | 1,137,500[28a] | 3,290,000[28b] | 1,750,000 | 1,442,260 | −18,600[28d] | 707,945 |
| 29 | 1,750,000 | 3,000,000[29a] | 3,600,000[29b] | 1,750,000 | 3,107,177 | 4,122,870 | 4,446,091 |
| 30 | 450,000 | 639,248[30a] | 2,000,000[30b] | 530,000 | 540,745 | 1,780,095 | 1,052,579 |
| 31 | 29,750,000 | 108,000,000[31a] | 100,000,000[31b] | 44,950,000 | 98,551,542[31c] | 107,830,000[31d] | 92,931,854[31d] |
| 32 | 480,000 | 806,572[32a] | 1,116,000[32b] | 655,000 | 1,036,489[32c] | 1,325,549 | 1,401,543 |
| 33 | 154,000 | 335,000[33a] | 465,277[33b] | 154,000 | 175,655[33c] | 168,255 | 247,556 |
| 34 | 3,276,000 | 6,107,675[34a] | 16,100,000[34b] | 6,416,000 | 4,000,522[34d] | 3,941,747[34d] | 3,439,514[34d] |
| 35 | 1,046,423 | 1,667,000[35a] | 1,872,000[35b] | 1,243,803 | 279,710[35c] | 182,574 | 282,282 |

NOTES FOR TABLE I

1*a*. Prospectus of company. See Dewing, A. S., Corporate Promotions and Reorganizations, p. 21.

1*b*. This is one of the three cases in which the estimate of earnings was not obtained from printed sources. One of the tanners stated in conversation that the "net saving would be at least $300,000, which would result in increased profits." On this basis the estimated earnings were obtained by adding the "previous earnings" to $100,000. Unquestionably the tanners believed that the profits would be vastly larger. They planned numerous "economies," and laid great stress in their conversations with bankers upon the increased earnings following the suspension of competition. The figure used here is, therefore, very much less than that confidently expected by the promotors. See also ibid., p. 21.

1*c*. This represents the first full year. 60 Commercial and Financial Chronicle 391. (The references to this periodical will be abbreviated hereafter, Chron.)

1*d*. In computing the average, the published earnings for the first 20 months were reduced to a 12-month basis. This gave the constructive earnings of the first year as $472,053. This reconstruction was necessitated by the change in the corporation's fiscal year. See table of earnings, Dewing, Corporate Promotions and Organisations, p. 22, footnote 3.

2*a*. Average of the preceding five years, 65 Chron. 619.

2*b*. Ibid.

2*c*. Dewing, Corporate Promotions and Reorganisations, p. 294, footnote 1.

2*d*. Earnings for third year, adjusted owing to change in fiscal year.

3*a*. Average of preceding four years, 67 Chron. 1206.

3*b*. Estimate of "$1,800,000 to $2,000,000." Ibid.

3*c*. Computed by adding five-twelfths of the profits of 1900 to the deficit for the 7 months of 1899 during which company operated.

3*d*. From 1902 to 1909 the company published no reports. The probable profits have been constructed from the surplus as at the beginning and end of the period, with adjustments for capital expenditures during the intervening period.

4*a*. 66 Chron. 1003.

4*b*. Ibid.

5*a*. 67 Chron. 177.

5*b*. 13 U. S. Ind. Com. of 1901, 409.

6*a*. Average preceding five years, 68 Chron. 974.

6*b*. This is the second of the three cases in which the estimate of earnings is not obtained from printed sources. It is based on two statements, both agreeing that the company would be able to earn at least 6 per cent on its common stock. One of these statements was made by a prominent manufacturer to a small independent who was asked to enter the consolidation. One other was made to a banker by a man close to the promotion.

6*c*. Adjusted to 12 months from published statement of 14 months.

7*a*. Average preceding two years, 68 Chron. 280.

7*b*. Ibid.

7*c*. Adjusted to 12 months from published statement of 21 months.

8*a*. 68 Chron. 1029.

8*b*. 68 Chron. 280.

8*c*. Adjusted to 12 months from published statement of 14 months.

9*a*. 69 Chron. 1249.

9*b*. Ibid.

9*c*. Adjusted to 12 months from published statement of 16 months.

10*a*. 68 Chron. 1021.

10*b*. Ibid.

10*c*. From published statements the earnings for the first period of 13 months were constructed. This figure was then adjusted to a 12-month basis.

11*a*. 70 Chron. 77.

11*b*. 69 Chron. 646. More extravagant estimates were made by the promotor. One Thomas J. Ryan, in Shoe and Leather Reporter, May 18, 1899, estimated "economies of consolidation" at $4,000,000; in ibid., May 24, 1899, $5,300,000 to $6,900,000 or "7% on the preferred and from 8% to 12% on the common stock."

11*c*. Adjusted to 12 months from published statement of 9 months.

11*d*. The sinking fund on the bonds was deducted, as was not done in other cases, from the net earnings because the management and its auditors specifically state that the sinking fund on the bonds was a charge in lieu of depreciation.

12*a*. Given at $300,000 in 68 Chron. 1130. Figure stated above taken from banker's circular, at time of promotion.

12*b*. Banker's circular at time of promotion.

13*a*. Average for preceding three years, 69 Chron. 745.

13*b*. 69 Chron. 745.

13*d*. The company published no reports from 1902 to 1909, due probably to the excessive losses it was enduring. On September 1, 1902, the report showed an apparent surplus of $819,862. On September 1, 1909, the report showed an apparent deficit of $3,067,165. The above average is based on the assumption that the net loss of $3,897,027 during the intervening seven years can be prorated — $556,718 average loss per year.

14*a*. 68 Chron. 472.

14*b*. This is the third of the three cases in which the estimate of earnings is not obtained from printed sources. The bankers who were interested in the underwriting of the securities were assured by the mill operators that the company would earn "6% on its common stock" and would probably do better. This estimate is, therefore, computed as the preferred dividend of 7 per cent together with a common dividend of 6 per cent.

15*a*. Average for the preceding ten years, 69 Chron. 128.

15*b*. 69 Chron. 128.

15*c*. Adjusted to 12 months from published statement of 17 months.

16*a*. 1900 Moody 617.

16*b*. 68 Chron. 723.

17*a*. 68 Chron. 187.

17*b*. Ibid.

17*c*. Adjusted to 12 months from published statement of 11 months.

18*a*. 68 Chron. 524.

18*b*. Ibid.

19*a*. 69 Chron. 81; Dewing, Corporate Promotions and Organizations, p. 316.

19*b*. Ibid.

19*c*. Adjusted to 12 months from published statement of 11½ months.

19*d*. Computed from successive published balance sheets. Sinking fund on bonds deducted from net earnings as company considered such charges were made in lieu of depreciation.

20*a*. 69 Chron. 442.

20*b*. Ibid.

20*c*. Adjusted to 12 months from published statement of 16 months.

21*a*. 68 Chron. 131.

21*b*. Ibid.

22*a*. 68 Chron. 674.

22*b*. Ibid.

23*a*. 68 Chron. 872.

23*b*. Ibid.

23*c*. Adjusted to 12 months from published earnings of 11 months.

24*a*. 69 Chron. 286.

24*b*. 8 Ind. Com. Rep. of 1901, 55.

24*c*. 72 Chron. 774.

25*a*. 68 Chron. 333.

25*b*. Ibid.

26*a*. 73 Chron. 841.

26*b*. 71 Chron. 32. "Confidently expected earnings will be largely increased." This was the current report in the Pittsburgh district. One rumor stated that the earnings would be "twice as great." Nevertheless, in the absence of direct evidence for a larger estimate, the estimated earnings were considered the same as the previous earnings.

26*c*. Adjusted to 12 months from published earnings of 13 months.

27*a*. 68 Chron. 929.

27*b*. Ibid.

27*c*. 75 Chron. 1252. Reference inexact "12 to 14 mos." Computed on average of 13 months and reduced to 12 months basis.

28*a*. 72 Chron. 874.

28*b*. 72 Chron. 937.

28*d*. Boston News Bureau, October 12, 1911—after allowing for depreciation.

29*a*. 72 Chron. 1036.

29*b*. Boston News Bureau, November 14, 1901.

30*a*. 68 Chron. 329.

30*b*. Ibid.

31*a*. Wilgus, United States Steel Corp., p. 33.

31*b*. 72 Chron. 441.

31*c*. Adjusted to 12 months from published earnings of 9 months.

31*d*. The computation of the United States Steel Corporation's "net earnings" has always presented considerable difficulties owing to the management's avowed purpose of charging capital betterments to earnings. Wall Street has interpreted this policy as "squeezing out the water." Expedient tho it may be from the standpoint of business, it is disconcerting to the statistician, especially in an inquiry like the present, where uniformity in methods of accounting is a prerequisite to the value of any of the conclusions. In this study the net earnings of the United States Steel Corporation were computed as the sum of: surplus for the year, sinking fund on subsidiary and parent bonds and interest of United States Steel Company bonds, expenditures made for additional property, preferred and common stock dividends.

32*a*. 74 Chron. 1359.

32*b*. Ibid.

32*c*. Adjusted to 12 months from published earnings of 15 months.

33*a*. Average of three years, 75 Chron. 983.

33*b*. Estimate computed from estimated capacity (75 Chron. 983) reduced to current basis of profit.

33*c*. Adjusted to 12 months from published earnings of 15 months.

34*a*. 76 Chron. 975. In 79 Chron. 157, it is stated that the average for the preceding 5 years, before depreciation, was $6,519,017. Also, by dead reckoning, the estimated earnings would appear to be $9,500,000, provided tonnage of 1903 had been in service.

34*b*. Ripley, W. Z., Trusts, Pools, and Corporations, p. 107.

34*d*. These are based on the published earnings. Later the management admitted that the depreciation reserves had been inadequate and charged off a lump sum from the excessive earnings of the Great War. An attempt was made in another connection to determine the earnings more accurately by prorating the depreciation. The largest published earnings, however, were used here so as to give the corporation the benefit of a possible doubt. See Dewing, Financial Policy of Corporations, vol. 4, p. 49.

35*a*. Average of preceding three years, 75 Chron. 247.

35*b*. 75 Chron. 1044.

35*c*. Adjusted to 12 months from published earnings of 5 months 6 days.

TABLE II. — EARNINGS OF THE SEPARATE PLANTS BEFORE CONSOLIDATION COMPARED WITH EARNINGS AFTER CONSOLIDATION

| | Previous to estimated earnings | Previous to sum of fixed and contingent | Previous to first year | Previous to tenth year | Previous to ten-year average |
|---|---|---|---|---|---|
| 1 | 98.0 | 90.0 | large | 100.3 | 128.0 |
| 2 | 56.5 | 743.1 | 577.5 | large | 330.8 |
| 3 | 60.8 | 93.3 | large | 658.0 | 966.0 |
| 4 | 51.7 | 111.8 | 93.9 | 74.9 | 86.2 |
| 5 | 73.3 | 209.3 | 144.1 | 250.9 | 171.5 |
| 6 | 69.6 | 118.2 | 87.8 | 59.3 | 84.5 |
| 7 | 34.3 | 178.4 | 178.6 | 29.1 | 70.0 |
| 8 | 72.6 | 138.1 | 58.9 | 100.1 | 58.5 |
| 9 | 92.3 | 69.0 | 128.8 | 212.2 | 115.9 |
| 10 | 105.7 | 311.0 | 81.4 | 36.6 | 46.7 |
| 11 | 57.7 | 112.0 | 171.2 | 75.9 | 154.8 |
| 12 | 73.8 | 93.7 | 98.0 | 194.2 | 173.1 |
| 13 | 58.7 | 523.6 | 393.1 | large | large |
| 14 | 86.4 | 231.2 | 78.9 | 62.0 | 92.4 |
| 15 | 56.9 | 72.5 | 149.5 | 88.7 | 106.6 |
| 16 | 52.7 | 248.0 | 72.6 | 91.1 | 78.7 |
| 17 | 67.5 | 208.1 | 74.4 | 116.2 | 89.6 |
| 18 | 75.0 | 128.6 | 93.1 | 82.2 | 66.1 |
| 19 | 69.1 | 176.0 | 101.8 | 311.8 | 153.5 |
| 20 | 75.3 | 182.0 | 128.1 | 223.9 | 120.4 |
| 21 | 50.0 | 171.3 | 67.1 | 9.6 | 79.8 |
| 22 | 74.8 | 147.5 | 70.7 | 158.3 | 128.1 |
| 23 | 98.3 | 272.0 | 187.1 | 49.7 | 109.3 |
| 24 | 56.9 | 201.9 | 123.1 | 101.3 | 109.5 |
| 25 | 78.5 | 159.3 | 82.2 | 129.5 | 128.5 |
| 26 | 100.0 | 228.5 | 123.0 | 113.4 | 213.0 |
| 27 | 78.6 | 146.1 | 152.2 | 120.4 | 139.6 |
| 28 | 34.6 | 64.9 | 78.8 | large | 160.6 |
| 29 | 83.3 | 171.6 | 96.5 | 72.8 | 67.5 |
| 30 | 32.0 | 120.8 | 118.2 | 35.9 | 60.8 |
| 31 | 108.0 | 240.3 | 109.6 | 100.1 | 116.2 |
| 32 | 72.7 | 123.0 | 77.8 | 60.8 | 57.5 |
| 33 | 72.0 | 218.5 | 191.0 | 199.1 | 135.4 |
| 34 | 37.9 | 95.3 | 152.6 | 154.9 | 177.1 |
| 35 | 89.0 | 134.1 | 596.0 | 912.5 | 588.5 |
| Median | 72.6 | 171.3 | 118.2 | 101.3 | 116.2 |
| Average between quartiles | 70.1 | 166.8 | 118.5 | 122.4 | 118.5 |

TABLE III. — PROMOTORS' ESTIMATES OF EARNINGS COMPARED WITH PREVIOUS AND LATER EARNINGS

| | Estimated to previous | Estimated to sum of fixed and contingent | Estimated to first year | Estimated to tenth year | Estimated to ten-year average |
|---|---|---|---|---|---|
| 1 | 102.1 | 91.6 | large | 102.4 | 132.4 |
| 2 | 177.0 | 1314.0 | 1022.2 | large | 585.0 |
| 3 | 164.5 | 153.3 | large | 108.2 | 1589.0 |
| 4 | 193.2 | 216.5 | 181.1 | 144.5 | 166.7 |
| 5 | 136.6 | 285.9 | 196.8 | 342.5 | 234.1 |
| 6 | 143.7 | 170.0 | 126.3 | 85.2 | 121.5 |
| 7 | 291.0 | 520.0 | 519.6 | 84.8 | 203.9 |
| 8 | 137.9 | 190.5 | 82.4 | 138.1 | 79.2 |
| 9 | 108.6 | 752.9 | 139.6 | 229.8 | 125.6 |
| 10 | 96.5 | 300.0 | 78.4 | 35.3 | 45.0 |
| 11 | 173.5 | 194.1 | 297.0 | 131.8 | 268.5 |
| 12 | 135.6 | 127.2 | 132.1 | 263.2 | 235.0 |
| 13 | 171.0 | 893.5 | 669.1 | large | large |
| 14 | 115.7 | 267.9 | 91.3 | 71.7 | 107.1 |
| 15 | 175.9 | 127.5 | 262.9 | 155.9 | 188.7 |
| 16 | 190.0 | 471.6 | 137.8 | 172.9 | 149.5 |
| 17 | 148.0 | 307.5 | 110.1 | 172.0 | 132.5 |
| 18 | 133.5 | 171.5 | 125.6 | 109.6 | 88.3 |
| 19 | 144.7 | 254.2 | 147.2 | 451.1 | 222.0 |
| 20 | 132.9 | 241.9 | 170.2 | 297.6 | 159.9 |
| 21 | 200.0 | 343.0 | 134.4 | 1930.5 | 160.1 |
| 22 | 128.7 | 197.1 | 94.6 | 211.7 | 171.2 |
| 23 | 102.1 | 277.0 | 190.8 | 50.7 | 111.5 |
| 24 | 175.5 | 354.5 | 216.3 | 178.1 | 192.5 |
| 25 | 127.5 | 202.9 | 104.5 | 165.2 | 162.1 |
| 26 | 100.0 | 228.3 | 123.0 | 113.5 | 213.2 |
| 27 | 127.2 | 185.4 | 193.5 | 152.9 | 177.7 |
| 28 | 289.0 | 188.1 | 227.9 | large | 464.9 |
| 29 | 120.0 | 205.9 | 115.8 | 87.3 | 81.0 |
| 30 | 312.9 | 377.6 | 370.0 | 112.2 | 189.9 |
| 31 | 92.6 | 222.5 | 102.9 | 92.7 | 107.8 |
| 32 | 138.5 | 170.5 | 108.6 | 84.2 | 79.8 |
| 33 | 138.9 | 302.2 | 265.2 | 277.0 | 188.4 |
| 34 | 263.9 | 251.1 | 402.7 | 408.0 | 467.0 |
| 35 | 112.4 | 150.3 | 669.2 | 102.3 | 662.0 |
| Median | 138.5 | 228.3 | 147.2 | 165.2 | 171.2 |
| Average between quartiles | 145.0 | 239.4 | 186.1 | 189.2 | 174.8 |

TABLE IV. — COMPARISON OF THE SUMS OF THE FIXED AND CONTINGENT CHARGES, WITH THE PREVIOUS, THE ESTIMATED AND THE LATER EARNINGS

TABLE V. — COMPARISON OF THE EARNINGS OF THE FIRST YEAR WITH THE PREVIOUS ESTIMATED AND LATER EARNINGS

| | Sum of fixed and contingent to previous | Sum of fixed and contingent to estimated | Sum of fixed and contingent to first year | Sum of fixed and contingent to tenth year | Sum of fixed and contingent to ten-year average | First year to previous earnings | First year to estimated earnings | First year to sum of fixed and contingent charges | First year to tenth-year earnings | First year to ten-year average |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 111.2 | 109.0 | large | 111.6 | 142.4 | small | small | small | small | small |
| 2 | 13.5 | 7.6 | 77.7 | large | 44.5 | 17.3 | 9.8 | 128.5 | large | 57.2 |
| 3 | 107.1 | 65.2 | none | 732.5 | 1039.0 | small | small | small | small | small |
| 4 | 89.8 | 46.4 | 84.3 | 67.2 | 77.3 | 106.9 | 55.2 | 119.5 | 79.8 | 92.0 |
| 5 | 47.8 | 35.0 | 68.8 | 119.7 | 83.9 | 69.5 | 50.8 | 145.2 | 174.1 | 119.0 |
| 6 | 84.8 | 58.9 | 74.6 | 50.3 | 71.6 | 113.9 | 79.2 | 134.7 | 67.5 | 96.2 |
| 7 | 56.0 | 19.2 | 99.9 | 16.3 | 39.2 | 56.2 | 19.3 | 100.3 | 16.4 | 39.4 |
| 8 | 72.4 | 52.5 | 42.7 | 72.5 | 41.5 | 169.6 | 122.9 | 234.2 | 169.8 | 97.5 |
| 9 | 14.4 | 13.3 | 18.6 | 30.5 | 16.7 | 77.7 | 71.7 | 539.0 | 164.6 | 90.0 |
| 10 | 32.1 | 33.3 | 26.1 | 11.8 | 15.0 | 121.9 | 127.4 | 382.5 | 45.0 | 57.4 |
| 11 | 89.2 | 51.5 | 152.9 | 68.7 | 138.3 | 58.4 | 33.7 | 65.4 | 44.4 | 90.4 |
| 12 | 106.6 | 78.7 | 104.7 | 207.1 | 184.7 | 102.6 | 75.5 | 96.3 | 199.2 | 177.9 |
| 13 | 19.1 | 11.2 | 75.1 | large | large | 25.5 | 14.9 | 133.5 | small | small |
| 14 | 43.2 | 37.3 | 34.1 | 26.8 | 39.9 | 126.9 | 109.6 | 298.8 | 78.7 | 117.1 |
| 15 | 138.0 | 78.3 | 205.9 | 122.1 | 147.1 | 67.1 | 38.1 | 48.6 | 59.4 | 71.4 |
| 16 | 40.3 | 21.2 | 29.3 | 36.7 | 31.8 | 137.7 | 72.6 | 361.1 | 125.4 | 108.5 |
| 17 | 48.0 | 32.4 | 35.7 | 55.8 | 43.1 | 134.3 | 90.8 | 279.8 | 156.2 | 120.4 |
| 18 | 77.8 | 58.3 | 73.2 | 64.0 | 51.4 | 106.2 | 79.7 | 136.6 | 87.5 | 70.3 |
| 19 | 56.8 | 39.4 | 57.9 | 177.3 | 87.3 | 98.4 | 68.0 | 172.9 | 306.5 | 150.7 |
| 20 | 54.8 | 41.3 | 70.3 | 122.8 | 66.1 | 78.0 | 58.8 | 142.0 | 174.6 | 93.9 |
| 21 | 58.3 | 29.2 | 39.1 | 563.0 | 46.7 | 149.0 | 74.5 | 255.7 | 1437.0 | 119.1 |
| 22 | 65.3 | 50.8 | 48.0 | 107.4 | 86.9 | 136.2 | 105.8 | 208.4 | 223.9 | 181.2 |
| 23 | 36.8 | 36.1 | 68.9 | 18.3 | 40.3 | 53.4 | 52.5 | 145.0 | 26.6 | 58.4 |
| 24 | 45.5 | 25.9 | 56.0 | 50.3 | 54.3 | 81.3 | 46.3 | 164.1 | 82.3 | 89.0 |
| 25 | 62.8 | 49.2 | 51.5 | 80.5 | 79.8 | 121.8 | 95.7 | 194.1 | 156.2 | 155.0 |
| 26 | 43.8 | 43.8 | 53.8 | 49.7 | 93.2 | 81.3 | 81.3 | 185.9 | 92.2 | 173.5 |
| 27 | 68.5 | 53.9 | 104.4 | 82.5 | 95.8 | 65.8 | 51.7 | 95.8 | 79.1 | 91.9 |
| 28 | 153.9 | 53.2 | 121.1 | large | 247.1 | 126.8 | 43.8 | 82.4 | large | 203.8 |
| 29 | 58.3 | 48.6 | 56.3 | 42.4 | 39.4 | 103.6 | 86.3 | 177.7 | 75.3 | 69.9 |
| 30 | 82.9 | 26.5 | 98.1 | 29.6 | 50.3 | 84.7 | 27.1 | 102.2 | 30.4 | 51.5 |
| 31 | 41.6 | 45.0 | 45.7 | 41.7 | 48.4 | 91.1 | 98.6 | 219.1 | 91.3 | 106.1 |
| 32 | 81.3 | 58.7 | 63.2 | 49.4 | 46.7 | 128.6 | 92.8 | 158.3 | 78.2 | 73.9 |
| 33 | 45.9 | 33.1 | 87.7 | 91.5 | 62.2 | 52.4 | 37.8 | 114.0 | 104.5 | 71.0 |
| 34 | 105.0 | 39.9 | 160.4 | 162.8 | 186.5 | 65.6 | 24.8 | 62.4 | 101.5 | 116.5 |
| 35 | 74.6 | 66.3 | 444.0 | 690.0 | 439.2 | 16.7 | 14.9 | 22.4 | 152.2 | 98.7 |
| Median | 58.3 | 43.8 | 70.3 | 72.5 | 71.6 | 84.7 | 58.8 | 142.0 | 91.3 | 91.9 |
| Average between quartiles | 62.7 | 43.4 | 72.3 | 72.1 | 90.1 | 89.4 | 60.7 | 145.1 | 107.8 | 89.6 |

# THE DOMESTIC AND FOREIGN WOOL MANUFACTURES AND THE TARIFF PROBLEM


## SUMMARY

I. Conditions on the Continent, 103. — In Great Britain: technical advance, 106. — Overhead charges, 113. — Labor conditions, 114. — II. American experience: overexpansion of productive capacity and increase in disadvantageous lines, 118. — Conditions of technical equipment, 120. — Wage conditions, 126. — Standardization of products, 128. — Industrial organization, 129. — Possible improvement in competitive strength of American industry: through technical advance, 130. — Through control of wages, 133. — Through increased standardization, 134. — Conclusion, 135.


THE prospective revision of the tariff into a "permanent" form may serve as the occasion for a reconsideration of the competitive position of the American wool-manufacturing industry, the industry whose tariff schedule has in the past been of outstanding importance in any general change of import duties. Beyond the importance arising from the intrinsic place of this industry in our economic life, a certain significance attaches to these tariff paragraphs by reason of the impression which has in recent decades been quite widely accepted, that Schedule K formed "the backbone of protection." It suffices to point in this connection to the part played in subsequent political discussions by the wool paragraphs incorporated into the Payne-Aldrich Act.

Without prognostication of the probable future tariff rates, we may profitably examine the experience of the American and foreign wool-manufacturing industries during the last decade or so, noting particularly those

changes in their economic position which add to or detract from the competitive strength of the domestic trade, and deriving therefrom the situation in which the anticipated tariff revision finds the American industry. In considering these questions, it will be convenient to survey the foreign manufactures first.

## I

Interest centers strongly upon the Continental industries at the present time, perhaps in part from the fact that actual knowledge of industrial conditions in those countries is relatively scant and that conditions there are more unstable than in Great Britain or the United States. Take, for example, the matter of raw material supplies for the Continent. We know that supplies of wool in France, Belgium, and Germany were peculiarly low at the time of the armistice, and that replenishment has gone on haltingly since that time, complicated by the lack of purchasing power on the part of Continental merchants and manufacturers, lack of credit facilities, the uncertainties of exchange, and in the case of Germany and Austria the question of pre-war debts. Belgium, then France, and more recently Germany, have been able to buy in the English or colonial wool markets — or to some extent at the wool sales at Antwerp specially arranged for by the British government and the London wool brokers — but purchases must, on account of exchange fluctuations, be intermittent. Germany this month may be able to buy largely — even dominate a quiescent London market — but next month may be forced by falling exchange rates to withdraw almost completely. Just how adequately stocked the Continental mills may be we can only guess.

Nevertheless, progress on all lines has undoubtedly been made. Peace found working forces largely scat-

tered or disorganized, machinery destroyed or perforce allowed to deteriorate, and commercial connections broken. The French wool manufacture suffered most. The enemy controlled the great wool center of Roubaix-Tourcoing, and small centers such as Fourmies and Le Cateau; and the second largest wool-manufacturing city was the much devastated Rheims. Recovery has been retarded, moreover, by serious labor difficulties, especially around Roubaix. In Belgium, the losses of the industry were due in part to the dislocation of its working force, and in part to the removal and wearing-out of technical equipment; but on the whole the Belgian manufacture survived as well as any in the belligerent countries of the Continent. From what one can learn of it, the German industry falls between these two extremes. The Belgian manufacture in any case would probably have revived first; but the German would presumably have outstripped the French in recovery, had it not been for general factors operating in Germany, such as the uncertainties of the peace terms, internal unrest, and particularly disadvantageous exchange relations. Speaking generally, conditions on the Continent as a whole have so far changed that whereas in the summer and fall of 1919 Continental manufacturers were glad to secure work on commission from English houses, more recently French and Belgian yarns and cloths have invaded the English and other foreign markets and, as above intimated, the Germans have been able to purchase raw material quite extensively in the world markets and begin work "on their own."

Apparently as an indirect result of the war, the Continental manufacturers have secured, at least temporarily, a position of greater competitive strength than they possessed in the pre-war period, despite such adverse factors as (probably) lowered efficiency. It will

perhaps be recalled that the Tariff Board ten years ago found the conversion costs in e. g., the German industry (where among Continental countries inquiry seems to have been most adequate) were somewhat less favorable, as compared with those of American producers, than those of English manufacturers.[1] It is also true that the free-trade English market was relatively free from Continental importations, and that the bulk of such importations that did reach England was in character different from the chief British productions: imports of French-system or Belgian-system yarns, cloths of the soft, Continental type, and the like.

Data on the current situation are of course relatively scarce, but certain facts are available. Rates for commission scouring, carbonizing, and combing are always suggestive tho indicating probably the extreme in comparative costs throughout the whole industry. In this connection, a recent German combing schedule may be instanced. The charges therein ran from approximately 5¾ cents per pound for low crossbred wool to 6⅞ cents for merino to half-blood.[2] Such rates appear as 40 to 60 per cent of the current Bradford charges, and the latter in turn are 50 to 70 per cent of representative American rates. As the *Wool Record* states in comment upon the German charges, "There is no doubt that when trade does begin to revive, competition in all the markets of the world will be exceptionally keen." Already the British industry is feeling the competition of Continental producers along certain lines, as in the supply of knitting yarns to the Leicester knit-goods trade. During the war period, the British spinners had a practical monopoly of this business, but now the soft, French-system worsted yarns and the Belgian-system woolen

1. Tariff Board Report on Wool and Wool Manufactures, pp. 16, 17.

2. Wool Record and Textile World (Bradford, Eng.), March 10, 1921, p. 15. The German charges were converted at the then existing rate of exchange.

yarns from the Continent are making severe inroads into it and pushing out British yarns of both the French and the Bradford worsted systems.[3] Repeatedly in the British discussions of their own present situation appear forebodings of severe trials from the future increased Continental importations.

The causes of such an alteration in competitive strength are difficult to ascertain. As far as I know, they arise from no conditions peculiar to the wool manufacture, but wholly from the general economic forces. Such factors as a lowered standard of living among Continental peoples, an incitement to more continuous labor flowing from the worsened position of the workers, and the eagerness of manufacturers to secure employment for their men and their machines undoubtedly play their part. Whether such a situation is to be the post-war normal is of course problematical. All we can now say is that conditions in the wool manufacture will presumably follow the general economic and industrial movement.

With respect to the changes in the British industry itself and in its competitive position, it will suffice for our purposes to consider three general phases: the technological aspect, certain overhead charges, and the labor side. Changes in the technique of the British industry in the last decade, tho not revolutionary, have shown in some aspects distinct advance. For example, largely as an indirect result of the war, the scope of raw materials employed generally through the British industry has been broadened. In pre-war times wools containing so much vegetable matter as to require chemical treatment, or so-called "carbonizing wools,"

3. A recent comment from England reads: "Both France and Germany can sell much below British prices in Botany (the finer) yarns, and this is especially noticeable in fine singles and two-folds. In 2–66s and 2–70s the disparity is said to be as much as 1 *s.* per pound (around 15 per cent), and this is entirely due to the lower conversion costs on the Continent." Wool Record and Textile World, September 1, 1921, p. 559.

were usually disposed of on the Continent. British woolen manufacturers would not bother with this inferior tho cheap stock. During the war, however, the British were compelled to use more and more of this type of wool, carbonizing capacity was materially increased, and today the British woolen trade can work and does work this relatively inexpensive staple. It has been stated, moreover, that the better lengths of such wool have been utilized in blends for the manufacture of tops.[4] Again, before 1914, South African and South American wools were largely neglected by the British wool manufacture, chiefly by force of habit or prejudice. War exigencies compelled British combers and spinners to become acquainted with these staples. They will accordingly be able not only to secure somewhat varying effects by the utilization of these wools, but also to take advantage of variations in price of these goods from that of their better known Australasian wools.

On the American side, changes of the above types have not been numerous, nor in some cases do they promise to be permanent. Take, for example, the situation with respect to Cape wools. Before the war, under the Republican tariffs, trade in these fleeces was negligible. Because of the fine character of these wools and of the sandy country in which they are grown, they have a peculiarly high shrinkage, and consequently could not be advantageously imported. During the war, with free importation of wool, South African staples became a fairly common article in our markets.[5] Whether or not this trade can be continued, depends on the character of the wool duties enacted in the new tariff. A

4. Such a development is disputed in the trade, but because of prejudice against the use of carbonized wools at all in the worsted industry it is difficult to ascertain the exact truth.

5. This movement was aided by the fact that the Australasian wools were taken over by the British government.

somewhat similar story with a somewhat similar ending might be woven around certain South American wools, such as the fine Uruguayan wools, or the low crossbreds which in the last year or two have found employment in our carpet trade.[6]

In the matter of technical equipment, two significant changes during the last decade have been the spread of the automatic doffer and the Northrop automatic loom. The former, a labor-saving device of a typically American sort, has been developed, oddly enough, exclusively in England. So far as I know, it has found absolutely no favor in our industry. By means of the automatic doffing "motions" (which in some cases may be attached to old frames and in others are the normal attachment of new spinning machines), the full bobbins upon one whole side of a spinning frame of either the cap or flyer types may be removed or "doffed," as the phrase goes, at one and the same time, and empty bobbins placed on the spindles.[7] The device eliminates the necessity of handling each bobbin separately, work which in the English mills has been one of the last important employments of "half-times." Yet the increased adoption by progressive British mills of this contrivance, altho fitting in well with the impending abolition of "half-timers," is not wholly the product of that new situation, since developments along this line date back to the eighties and adoption there has been going on gradually ever since that time. The installation of such "motions" has been considerably quickened in the last decade or so. American mill men, it is said,

6. Probably a more interesting change in the American raw material supply during the last decade has been the decline in the fine wool production within the United States, and the consequently greater dependence upon foreign, especially Australian products. But this involves a change in quantity, not of kind, and so has little influence on the matter now under consideration.

7. There are at least six different "motions" on the British market for spinning frames, and one has recently been devised for roving frames.

find it more advantageous to add something to the pay of the spinner who then takes care of the doffing. Can it be that the American wool-manufacturing industry, by virtue of its supply of immigrant labor, has reached the stage when it has no incentive to put in labor-saving improvements?

The automatic loom which has found favor in the British weaving sheds is of the Northrop type. "Northrop" and "automatic" are synonymous in the present British wool-manufacturing nomenclature. As yet the automatic loom of the box type which has been developed by the Crompton & Knowles Loom Works of Worcester (Mass.) has not been introduced in England, despite the fact that the ordinary box loom of the Crompton & Knowles type, made by the Dobcross people in England, one time licensees of the American firm, is the box loom most widely used in the woolen and fancy worsted districts of Great Britain.[8] On the whole, the automatic loom seems to have made less headway in England than in the United States. The character of a considerable portion of the British production — fine goods or goods of special design and limited quantity — does not fit well with the economy of this machine. At present geographically as well as industrially the scope of the loom is limited. For example, none are to be found in the Bradford district, even the Northrop loom not having been as yet adapted to the particular requirements of that manufacture. Outside the Huddersfield

8. One reason which is advanced for the readier adoption of the Northrop machine in the British worsted manufacture is that the greater homogeneity of worsted yarns in that country permits the use of a plain or single-shuttle loom. For many if not most mills in this country, it is necessary in weaving even single-color goods to employ at least two shuttles — requiring of course a box loom — both containing yarn that is theoretically identical in character. As the weaving proceeds, the shuttles are used alternately, or, in the jargon of the industry, the "fillings are mixed." Were such precautions not employed, the finished cloth would show a streak where a change occurred in the yarn delivered by the single shuttle (as one bobbin ran out of yarn and another was inserted), merely by reason of the yarn's lack of homogeneity.

plain goods and the flannel areas, few automatic machines are employed. On the other hand, the automatic loom has found considerable favor in the American industry. One plant working lustre wools, mohair, and alpaca has a virtually complete weaving equipment of these machines. Other mills have adopted it for portions of their work, even in lines where as yet it has not been tried abroad.[9] Accordingly, there is, I believe, a good prospect that in the wool manufacture, as in the cotton trade, the United States will lead the way in the wider utilization of this type of machine.

Another development of recent years, suggestive rather than of immediate competitive value, is the continuous woolen spinning frame. This mechanism, originally introduced in the spinning of cotton waste, holds out the possibility of eliminating the waste of time and the expense of skilled supervision involved in the operation of the woolen mule with its intermittent spinning action and its complicated system of movements. Essentially it is a modified ring frame. Altho spindles on such frames form an almost negligible proportion of total woolen spindles in the United Kingdom (little over 1 per cent), they have been found by some manufacturers to be of considerable utility for certain purposes, especially spinning substantial weights of good stock.[10] Such machines have not found welcome in this country, nor as far as I know, has there been a serious attempt to improve on the English mechanism.

Some progress, again, has been made in the British industry during the last decade in the elimination of hand labor in the processes intermediate between spin-

9. For instance, I have seen notice in an American textile magazine of a blanket mill to be completely equipped with automatic looms, a project which as yet would not be considered in England.

10. One Yorkshire manufacturer, usually inclined to break with the old British habit of secretiveness, thought so highly of it that tho communicative on other matters he refused to discuss this machine or to let visitors into his spinning shed.

ning and weaving. Two such processes rarely seen in American mills but still occasionally found in British plants are warping and hand-dressing. In the former process, the yarn is wound from the bobbins on to big, slow-running "warping mills" for the purpose of making up sections of the warp. Subsequently these sections are wound upon the loom beam. Dressing by hand is utilized at the time of this transference of warp to the loom beam in order that the various yarns of the warp should be properly and evenly arranged. By the improvement of beaming machinery and the greater development of motor transport (facilitating mill-to-mill transfers of the heavy and bulky loom-beams) the necessity of dividing the operation and of skilled manual intervention has been eliminated for most work. Warping and dressing are considered moribund trades in England. They persist only in certain localities and certain mills, especially in the dress-goods trade of the Bradford district.[11]

A further point of importance in connection with the technological aspect of the British wool manufacture is the marked increase within that industry of interest in scientific research, a curious instance of the influence of the chief loser in the World War upon one of the victors. A British Research Association for the Woolen and Worsted Industries has been formed among the manufacturers. Subscriptions of considerable amount have been raised, which together with a subsidy from the government's Department of Scientific and Industrial Research have enabled the purchase and equipment of a laboratory and the inauguration under experts of inquiries into various fields of wool-textile technique, such as woolen spinning and cloth finishing, of which little of

11. This change in British practice is significant despite the fact that it is really an adoption of earlier American practice.

a scientific character is known.[12] The discoveries made and the data developed in the course of these inquiries are published for the use of the Association members only, of which there are now over 450. The hope of the Association is, of course, to give "members the start by secret information" altho the data may in a year or two leak out to other manufacturers in England and particularly to those in competitive nations.[13]

But the course of the British industry has not been wholly forward, even in the technological aspect alone. One of the disadvantages, from a British point of view, arising indirectly from the war conditions is a decline in British standards of acceptable workmanship, as for example in finished cloths — a situation recognized by the British themselves. The increase in the number of burlers and menders in the mills themselves is instanced as an indication of the less efficient production of the goods, while in the merchandising trade it is stated that cloths have during and since the war passed as A–1 which prior to 1914 would have been shipped back to the manufacturer as unsatisfactory. This phenomenon may be merely the result of the war strain among the workers, as far as the manufacturing faults are concerned, or of the keenness of demand for all sorts of woolen goods which until the recent depression prevailed throughout England and condoned both carelessness of the workers and defects in the fabrics. The present period of depression may be corrective in both fields.

Passing to overhead charges, we may note that certain important items of general mill expense have increased

12. It is remarkable how little has been done in the way of scientific investigation in this industry, one of the oldest of man's activities. For example, men have been fulling cloth for hundreds of years, and yet the question is not fully decided why woolen cloths do full.

13. Wool Record and Textile World, April 28, 1921, p. 41.

not only more than the average enhancements of cost, but more than similar expenses in this country — among them, coal, dyestuffs, and taxes. Cheap coal has, of course, been for decades a supposedly firm foundation for British manufacture. It would be indulging too much in prophecy to state that coal in England will never be cheap again. But for the present the fuel item has become a much more considerable portion of the factory expense than ever before, and there is no immediate prospect of a change from this situation. Yorkshire and Scotland, to be sure, possess splendid possibilities in the development of hydro-electric power, but as yet little has been done for the wool manufacture in this regard. Wool dyes, too, have presented a somewhat serious problem to the British dyers. The manufacture of dyestuffs in England, as in the United States, seems destined to need governmental assistance for some years. In consequence, at least temporarily, the cost of dyestuffs is enhanced somewhat more than other costs have been increased in the last few years. The American dye industry, as it happens, before the war had produced a few of the standard wool dyes, and during the war period found wool dyes easier to develop. The wool manufacture has consequently been less disadvantageously affected than some other textile trades. Finally, the substantial increase in taxes, with the possibility of a higher range of prices for some articles through the duties on imports involved in the "safeguarding" of British industries,[14] or in imperial preference, should be mentioned, together with the charges upon the industry for health insurance and the like. By the degree to which the British manufacture is more unfavorably affected by such factors as these than

14. The British wool-manufacturing interest is apparently opposed to this policy; see a manifesto signed by many influential Yorkshire producers in the Wool Record, July 14, 1921, p. 106.

is the American industry, so is the competitive position of the American improved.[15]

Let us turn to the labor, the third of our subdivisions. Perhaps no phase of the British wool manufacture, with the possible exception of the industrial organization, has in the past contrasted more sharply with the American industry than that of the labor supply and organization, and in some respects this contrast has been heightened by the events of the last four or five years. Despite the demands for military forces during the war, the wool manufacture in the greater portion of its field was able, by reason of the military need for clothing as well as for men, to keep its working forces fairly well together. Some "dilution" with female labor did of course take place, and probably in part will be retained; but at least a fair proportion of these workers were partially trained operatives, for instance, women who had before marriage worked in the mills and who now with the increased cost of living or with the absence or death of their husbands were impelled to reënter the industrial field. It appears, too, that at demobilization the wool workers, perhaps by reason of the strong British characteristic of habit, returned in large numbers to their pre-war employment. In short, the skill of the British workers, which plays a considerable part in the manufacture of somewhat better goods at somewhat less cost, has probably not been seriously impaired by the war's upheaval. The temporary slackness of quality in work spoken of above will probably pass away, and something of the old conditions revive.

In this connection it may be pointed out that com-

15. Accurate statistics of these changes are very difficult or practically impossible to secure. Estimates for England were given by a British manufacturer recently. He found the ratios of the existing prices to pre-war prices for the several groups of goods and services mentioned above as: coal, 300–400 per cent; machinery, 300–500 per cent; insurance on stocks, 300–600 per cent; dye wares, 700 per cent; and various groups of wages at 320–350 per cent. Wool Record and Textile World, February 3, 1921.

paratively and absolutely the American labor forces have probably improved in character in recent years. At least, were another investigation to be made such as that of the Tariff Board into the turnover in the American mills, it is unlikely that such extraordinary frequency of movement into and out of the wool manufacture and from one mill to another within the industry would be discovered.[16] This change I attribute to the temporary diminution of the immigrant flood and to the relatively prompt and high advances in wages which have been made by the wool manufacture as compared with other industrial lines.[17] Of the permanence of this improvement, however, one may be doubtful.

The British wool industry has a further advantage from the point of view of labor, that of organization or perhaps we may call it orderliness. The formation of manufacturers' associations on the one side and of labor unions and labor union amalgamations on the other proceeded fairly rapidly during the war period and the year or so afterwards. The industry was accordingly well equipped for the adoption of that method of settling industrial troubles which involves the so-called Whitley Councils. Such an institution was organized in the early part of 1919, and by virtue of the dominance of one or two exceptional leaders on either side, perhaps also by reason of a rather conservative temper among the British wool workers, the Council has had on the whole very good success. Indicative of its effectiveness, in addition to the avoidance of all strikes and lockouts in the past unsettled two years, is the smooth working of its arrangements as to wages. War bonuses which had been given during the war years in terms of percentage of the pre-war wage rates were converted in 1919 into cost-of-

16. Tariff Board's Report on Schedule K, pp. 958-981.

17. Cf. below; also Reports of National Industrial Conference Board on Wage Changes in Industry.

living bonuses and tied directly to the index of the cost of living prepared by the Ministry of Labor. The test came, of course, when the peak of prices was reached and recession began. Suffice it to state that altho the cost-of-living percentage for time workers reached the point of 175 per cent above the 1914 base, it subsequently declined to 133 per cent without stoppage of work. Moreover, when the wage agreement came up in July, 1921, for readjustment, the workers accepted a cost-of-living bonus actually less than they would be entitled to if the direct correlation of cost-of-living index and bonus were adhered to.[18]

Above all, in this relation, I would emphasize the organization or orderliness of the business. The Industrial Council, representing well marshaled forces on both sides, settles through itself or through the regional councils the wage problems for the whole British wool-manufacturing industry, provides arbitration of industrial disputes in a semi-judicial method, and supplies a common meeting ground for the representatives of both capital and labor which under wise guidance by a clear-headed few seems to have been made the opportunity for the attainment of mutual understanding.[19] Contrast to this the condition in the American industry, with the lack of any adequate association on either side, with no

18. This program, the adoption of which was probably furthered by the industrial depression in the British manufacture, was naturally that of the employers, the purpose being to give them a firmer basis for forward quotations than if the original scheme were followed strictly. Altho the cost-of-living index was (August 1, 1921) at 230, the workers are to receive a bonus of only 105 per cent above base rates (time workers). If the index falls below 205, the bonus drops by stages of 10 points.

19. The nicety, or absurdity, to which wage agreements in the industry are carried is observable in the figures for cost-of-living bonuses of Saddleworth time workers — one example from many:

| | |
|---|---|
| Males 13–16 years of age | 67.351778 |
| " 16–19 " " " | 78.498024 |
| " 19–21 " " " | 89.486166 |

On the other hand, real orderliness in the woolen spinning branch of the industry has been enhanced through the development by representatives of the Industrial Council of piece rates in that trade.

opportunity for the interchange of opinions, and with no directing agency or body. Even wage changes have in most mills been stated in such a manner that the ordinary operative would have considerable difficulty in forming an independent judgment as to whether the movement of his wages has or has not kept in step with the changes in prices.

Besides the clarity of the British wage arrangements, making for industrial peace, there is the further advantage to the British wool manufacture that by reason of the particular method whereby actual wages are now determined — by ratios of pre-war rates tied to the cost-of-living index number, and adjustable monthly — the wages bill has decreased and will decrease with every considerable betterment of the British economic situation, whether the modification of the post-war speculative mania, the elimination of monetary depreciation, or the readjustment of general European conditions. American wage reductions will be fought by the labor unions and nothing but industrial depression of an unmistakable sort will enable the employers to win their point. In England, after a sufficient decline in the cost of living, the presumption is in favor of the manufacturers; labor must show cause why wages should not be reduced in accordance with the prearranged system.

On the other hand, to be sure, provisions attached to the wage agreements covering various branches of the British wool industry specify that wages shall not decline, whatever the course of general prices, fully to the pre-war level — labor shall register a net gain when the normal post-war conditions have appeared.[20] This aim is to be secured, as in the case of the well-deserving woolcombers, by means of special percentages upon the pre-

20. Beyond the gain through the shortening of working hours from 55½ to 48, without a decline in time wage and with a pro rata increase of piece wages.

war or base wages which are agreed by both sides to be permanent and independent of the "cost-of-living wage." In other cases, as that of the dyers, it is provided that after a certain point is reached wage reductions shall not be proportionate to decreases in the cost of living, but somewhat less — specifically in the dyers' case, in the ratio of .8426 to 1. Arrangements such as these, which have become general through the British industry, do not, however, seem to be held sacred in all circumstances. In the last wage agreement, 5 per cent of the previously granted 15 per cent "permanent" advance was withdrawn. At best, then, assuming both the United States and English returned to the pre-war level of prices, the decrease in the British advantage in wage rates will not be great.

## II

The experience of the American wool manufacture in the decade 1910–20 differs in some respects rather sharply from that of the British industry. During the first few years American producers were enjoying the protection of the Payne-Aldrich tariff rates, rates which by their height had almost immediately aroused criticism. The change to lower duties in the Underwood tariff had been hardly accomplished when the European war broke out. The new duties on wool cloths had then been in force only seven months. What the ultimate effects of these lower rates would have been upon the industry is difficult to estimate. In my opinion, they would have put American manufacture to a severe test, and while the industry as a whole would by no means have "gone to pot," some sections of it would have had to curtail operations or shut down completely.[21] From

21. I have in mind particularly the production of the finer fabrics and specialties, and the prosecution of some specialized branches of the worsted industry. A case has

that time to the recent general business depression, the industry found its path one of ease and prosperity. The dividend rates of many wool companies, such as the American Woolen or the Arlington Mills, are of themselves sufficient evidence. Contributing to this situation have been the absorption of Europe in war, the increased natural protection of higher freight rates, the general rise in prices, and the opportunity to supply certain neutral markets; not least, the extraordinary demand for military cloths by the United States government after our entrance into the conflict. Even after the conclusion of armistice and peace, the insistent demand for goods had sufficed up to the middle of 1920 to sustain the industry notwithstanding the increased importation of wool products from England and more recently the Continent. Accordingly, while the British industry was being tried and tested in the stress of wartime exigencies, the American had the ease of abnormal prosperity. Despite many divergent circumstances, one is struck with certain forcible resemblances of the present with the post-Civil War period. During that struggle also, northern woolen mills had enjoyed exceptional prosperity. New mills were built, the capacity of old ones enlarged, and various cotton mills were transformed for the production of wool fabrics. With what result upon the tariff? Before the war our wool manufacture had survived, and, I believe, had been content under tariffs of 30 and 24 per cent on manufactures, with a similar duty on the raw wool during the greater part of the time; but in 1865–66 the domestic producers organized and practically dictated the Woolens Act of

come to my attention where an experienced wool-comber and top-maker sold his plant outright after the first few months of operation under the 8 per cent duty accorded to tops by the Underwood tariff. A proper adjustment of rates of semi-manufactured articles would probably have saved considerable confusion and disruption in the worsted industry.

1867, to that time the highest sort of Schedule K that had been enacted. What should one expect at the present time?

In answering this question, attention must first be given to the expansion of productive capacity on the part of the American industry. It has been one of the outstanding features of the last decade and particularly of the war period, and seems to have outrun the broadening of the market for domestic wool goods.

The expansion of manufacturing facilities has been particularly great in the yarn-producing sections of the industry. While weaving capacity has increased at most 15 per cent, the number of woolen spindles has increased over 25½ per cent, French-system worsted spindles 65 per cent, and worsted frame spindles nearly 25 per cent.[22] The surprising growth in these sections of the industry, over and above the growth in the weaving section, is in considerable part attributable to the increase of the knit-goods industry, which itself produces little wool yarn for its own consumption. But there are other features connected with that growth which are apparently not as propitious for the industry as even the spread of this partly competitive manufacture.

It will be noted, for example, that the number of woolen spindles has increased faster than that of the

22. Statistics taken from the Census show the following:

| Machines. | 1909 | 1914 | 1918 (July 1) |
|---|---|---|---|
| Woolen carding sets (including shoddy cards) | 6,399 | 6,245 | 7,229 |
| Combing machines | 2,120 | 2,425 | 2,347 |
| Spinning spindles: | | | |
| Woolen | 2,156,000 | 2,080,000 | 2,706,000 |
| Worsted mule (French) | 423,000 | 670,000 | 699,000 |
| Worsted frame (Bradford) | 1,329,000 | 1,558,000 | 1,642,000 |
| Looms: | | | |
| Broad (50 inches and more) | 54,000 | 57,000 | 62,000 |
| Narrow (less than 50 inches) | 19,000 | 19,000 | 18,700 |

preparatory machines, woolen cards. Similarly, but with a greater disparity, while worsted spindles have as a whole expanded a third since 1909, combing machines have increased but approximately 10 per cent.[23] Such statistics suggest a trend toward the spinning of substantially finer yarns in the last decade. The production and use of such yarns are less satisfactorily fitted to American conditions than in the case of coarser yarns. In the manufacture and employment of fine yarns, greater care and labor per unit of output are required, other things being equal. Scouring must be carried on more carefully and combing more slowly. Drawing can be accomplished perhaps only with the introduction of added operations, the speed of spinning spindles must be lowered, and that of the loom modified. All along the line, higher counts mean added difficulties.

Again, there seems to be some duplication of equipment. The statistics show a sudden reaction toward the woolen manufacture after 1914, the more interesting because preceding decades had witnessed a fairly steady and quite decided decline in the position of that branch of the industry. The recent increase in carding sets and woolen spindles is to be explained in large part, of course, by the military demand for woolen fabrics, but in lesser measure by a renewed public desire for such goods.[24] At least, there has been a considerable exten-

23. Moreover, with the special expansion of the French system, a considerable proportion of the added combing machines must have been of the Continental type, of which the productivity is only about a third that of the standard Noble comb. Some allowance must, on the other hand, be made for the slower consumption of tops by the French-system spinning processes; for the employment of tops imported more freely under the relatively low (8 per cent) duty of the Underwood tariff; and something may be allowed for the greater productivity of combs in the commission combing establishments, which have grown materially in the last decade as compared with the same number of combs in integrated plants. However, with all allowances, the general situation — spinning equipment outrunning preparatory equipment — is sufficiently obvious, or in other words greater attenuation and more twist being given the average yarn. It should be added that the increase in wool consumption closely approximates the increase in preparatory machinery.

24. To be sure, the increased demand for cloths of woolen texture has in part been met by an extension of the manufacture of worsted-warp and woolen-weft fabrics.

sion of woolen spinning capacity at the same time as the large expansion of the worsted equipment, or closely following upon it. Inasmuch as most textile machinery wears out slowly, it is probable that a manufacturing capacity more than adequate for normal demands will persist for some time.

The particularly large increase in the French or Continental system of worsted yarn manufacture, to be observed in the above figures, is a further factor of questionable advantage to the American industry as a whole. To be sure, it gives a diversity to the American industry which even the British worsted industry lacks.[25] But the production of worsted yarns on this system is carried on by methods substantially different from those employed in most successful American industries. The type of wool chiefly employed, the greater care with which combing, drawing, and spinning must be prosecuted, and the general use of adult male spinners, all are adverse factors. The product is a soft, full yarn, lacking the firmness and strength which are imparted to the yarn in the Bradford worsted process. Their utilization in weaving is consequently hedged about with greater care and slower speed — conditions not propitious for an American industry. They have found employment, except insofar as used in the knit-goods industry, mainly in the production of the best grade of fabrics, such as fine, soft, drapey dress goods.[26] Finally, it should be noted that foreign competition — competition from the Continent — will presumably be strongest with respect to products of this Continental system, the mule-spun yarns and the soft, superior Con-

25. Less than 5 per cent of British worsted spindles are of the Continental or mule type.

26. Typical are the productions of the Passaic mills started years ago under German management. It may be added, moreover, that of our best dress goods a competent British observer recently stated he had seen none superior from any part of the world.

tinental cloths. In sum, I fancy this recently expanded branch of the wool manufacture to be the portion with the least competitive strength.[27]

Finally, it is probable that the increase of the industry's productive capacity even in its most restricted sphere has outrun the available market under normal conditions. There has been an increase of weaving capacity of from 10 to 15 per cent — taking into account both the increase in the number of broad looms and the spread of automatic looms — at the same time that knitted fabrics such as jersey cloth have been making extensive inroads into the field of woven wool goods and that the cotton industry has continued its encroachments on the same domain, as in the more extensive production of palm beach suitings.[28] It is a serious question whether such expansion is warranted by the growth in our population or the enhancement of our normal purchasing power.

Taking the whole matter of capacity into account, then, it is obvious, I believe, that all is not well. There has been a duplication of yarn-producing equipment which in mills carrying on both branches of the industry will lead to higher overhead charges through idle machinery, and which among specialized mills may easily lead to such severe competition as to eliminate profits from all but the more efficient establishments. Again, there has been a growth in weaving capacity beyond the probable normal demand for cloth, and particularly

27. The Continental system is not really a newcomer in this country, dating at least from the early or middle eighties. It could hardly be termed an "infant industry." Still one should not be too exacting when attempting to put a time limit on infancy in industry. Mr. Taylor, representing the National Mohair Growers' Association, recently stated to the Ways and Means Committee: "I am before you today representing the infant live-stock industry of America. We by actual figures and count are only 71 years old." Hearings on General Tariff Revision, 1921, p. 2691.

28. Such abnormal circumstances as the temporarily increased purchasing power of certain classes in the last year or two, or the decrease in demand due to the abbreviation of women's skirts may be disregarded.

there has been a tendency toward the manufacture of finer goods. While the action of certain of these factors might in time, with the growth of our market and the scrapping of obsolete machinery, be substantially modified or wholly eliminated, at present all are provocative, as after the Civil War, of complaints on the part of domestic manufacturers and of a susceptibility to see in any importations whatever a grievous injury to American industry.

In the character of the technical equipment, of which some features have been mentioned above, there has been no great change in the American industry during the last ten or fifteen years, with the exception of the automatic loom. Apparently now as then we possess some advantages and some disadvantages. The arrangement of the American factories is probably superior on the whole to that of British mills, with a somewhat greater edge in the case of the worsted mills than in that of the woolen factories.[29] American mills make more use of gravity and forced drafts for the conveyance of loose wool. The felting of the wool on account of which the British object to the forced-draft method of conveyance is not of sufficient moment for the greater bulk of our production to prevent the installation of such systems. On the other hand, the better British mills make use of carding machines which are wider and better constructed than our own. The woolen mules also appear of superior construction. We have no weaving mechanism which is equal to the British overpick loom for the production of plain fabrics. Our box looms, on the other hand, are as above stated identical in character for the most part to the similar loom so widely used in the British industry—they seem as well

29. In worsted we imported a British-bred manufacture, but our woolen manufacture "just grew."

made, and our manufacturers run the machines at somewhat higher speeds. And so it goes from section to section of the industry. On the whole, I would regard the American manufacturing equipment as equal to the British, but not superior to it even considering the present state of the automatic loom in the two countries; while the outlook for the future through progressiveness leans distinctly in favor of the foreign industry.

In the working of the mechanical equipment the American industry has an appreciable advantage. The greater effectiveness of the American manufacture is in part the result of somewhat better organized production, more attention to routing and the like; and in part the result of production on a larger scale in most branches of the industry — of which more later. With regard to the human element it is more difficult to speak conclusively. In certain portions of the manufacturing process, as for example, scouring, combing, drawing, and possibly carding and pressing, there is little difference to be discerned between American and foreign labor efficiency. The processes require chiefly semi-mechanical machine minding, and any advantage on either side of intelligence, inheritance, or training has little play. In weaving we seem to have the upper hand, probably in a measure at the expense of quality in product. Our manufacturers are able to push their workers somewhat more, with the result that more commonly here than abroad weavers will tend two, three, or even four looms (of the non-automatic type). In many of the finishing operations, however, the foreign workers, especially the English, have the advantage, probably in quantity and surely in quality of production, since there experience is of peculiar value and in experience the foreign worker far overtops the American.

Whatever the variation in skill and efficiency in the

several sections of the manufacture, it is, I believe, incontestable that the net advantage, even in the more favorably situated portions, is insufficient to counterbalance the higher scale of wages paid in the domestic industry.[30] Comparisons with foreign wage scales, and especially with those of the Continent, as of the present time, are difficult to make, and almost impossible to make accurately. However, certain general estimates may be taken to show the trend. Statistics pertaining to British wage rates of late 1919 and early 1920, published by the United States Tariff Commission, indicated that in most cases the wage rates in England were from 45 to 50 per cent of American rates.[31] Since then the movement of wages in the two countries has not been dissimilar, and I should expect to find roughly the same results were another comparison along such lines to be made today.

Another method of approach is that of wage changes since the pre-war period. The English total rates reached their maximum elevation in December, 1920, when most time workers were to receive 216¼ per cent more than they had been receiving in July, 1914 (with a maximum advance of 60*s*. 4½*d*. where such a maximum applied); the great proportion of male piece workers, 223½ per cent more; and most female piece workers, 232½ per cent more. Since that time, on account of the decline in the cost of living in England and of the new wage agreement, the ratios have decreased, until according to the last reports available the per-

30. This disadvantage of the American manufacturer is the more obvious since many occupations of the wool-working mill are paid at piece wages, and these rates are much higher. Greater effectiveness of the workers in such cases would, of course, affect only the distribution of overhead.

31. Report entitled A Survey of the British Wool-Manufacturing Industry, pp. 56–65. Wage rates for Great Britain were converted in this Report at the par of exchange; but I have here made allowance for the depreciation of the pound sterling which existed at the time these wage rates were secured.

centages for the three groups above mentioned were, respectively 125½, 135¼ and 141½ per cent.[32]

Exactly similar American figures are not available, and the best and most recent ones seem to be those compiled by the National Industrial Conference Board. The most comparable figure of the Board's report [33] is that of hourly earnings. The index figure of such earnings for men showed a rise of 203 per cent by June, 1920, and it remained above 200 per cent until December of that year, when it slid off two points. For women, the peak reached was 228 per cent, in June, 1920; but that rate was for the month only, and in the latter part of the year it too averaged around 200 per cent. Since the end of 1920 there has been a general decrease of 22½ per cent based on the workers' total wages, presumably bringing down the percentage of hourly earnings above the base of September, 1914 to around 132½ per cent for both men and women.[34] Despite the failings of the method of comparison here utilized, it is obvious that as far as relative wage scales are concerned, the American industry has at least gained nothing during the war and post-war periods. The disadvantage in wages under which the American manufacturer proceeded in 1914 — we have no accurate comparison even in the report of the Tariff Board — has been maintained or even increased in more recent years.

32. Based on data as of the middle of September, 1921.

33. Research Report No. 35 of the National Industrial Conference Board, Wage Changes in Industry, September, 1914–December, 1920, pp. 18–21.

34. Incidentally it may be noted that the increase in hourly earnings was greater for the wool-manufacturing industry than for any other reported in the Board's Report; also that the cost-of-living index as given by the Board showed an advance of only about 90 per cent when the index of hourly earnings for the wool manufacture was around 200 per cent above 1914. These facts suggest one of two things: either that the industry is lenient about its wage advances, or that through lack of organization the industry is under a severe handicap as compared with other industries of the country. In this latter regard, the influence of one or two of the more efficient firms, like the American Woolen Company, in setting the pace for wage advances seems to have been a disadvantage to the industry.

Comparative wage scales alone do not, of course, tell the whole story, any more than comparative excellence in mechanical equipment by itself. Already reference has been made to modifying factors, such as the administrative ability of American manufacturers, and to the relative initiative and skill on the part of American and foreign operatives. Further factors to be taken into account are comparative scale of operations and variance in form of organization. These can but be touched upon here.

The operation upon a larger scale in this country, speaking generally, both in the worsted and woolen branches [35] is of advantage to that industry mainly by reason of the standardization or quasi-standardization of product which has taken place to a notable degree in our manufacture. A conspicuous case is that of the Fulton serges, one of which, No. 3194, is used in the trade as a sort of foot-rule to measure the general fluctuations of wool cloth prices. Such goods, usually constructed in medium or medium-fine quality and of plain colors or conservative designs, may be secured in any bulk desired, are always substantially uniform in quality, color, and finish, and have filled in the past a wide and fairly constant demand from our consuming public. The virtual lack of such fabric production in other countries may, with such other factors as assurance of delivery, of "repeat," and credits, account for the alleged disappointment of cloth buyers who in 1913–14, anticipating the new lower tariff, journeyed to Europe and returned without placing any considerable orders.[36] In addition to fitting American requirements

35. The disparity in size of operations between this and European countries is greater in the case of worsteds than of woolens, altho in certain instances, such as the specialized woolen mills of the American Woolen Company, the relation is about the same in the two branches.

36. Reports in textile periodicals at the time. See also the recent account in testimony of Mr. William Goldman, representing the National Clothiers' Assn. of America

so closely, the production of such cloths in our mills is undoubtedly carried on with maximum effectiveness. Under such conditions the 35 per cent duty levied by the Underwood tariff would be much more valuable to American manufacturers than if our output were of the common European type. It may be added that in so far as our industry has departed more recently from the production of fabrics of that type under such conditions, its competitive position has, it seems to me, been weakened.

The second modifying factor above mentioned, difference in form of organization, applies chiefly to the worsted branch of the industry.[37] Here again the decision seems to depend upon the quality of fabric manufactured. In the case of the finer grades of goods, some net advantage seems to inure to differentiated European industries. There is the possibility of greater individual attention to blending or design; the probability of superior quality in the semi-manufactured articles; the possibility of more careful watch over manufacturing niceties; and similar features. In the bulk manufacture of medium-grade fabrics, on the other hand, integration of the American sort appears to enhance competitive strength.

The road to improvement in competitive strength in the American wool manufacture seems hedged about with difficulties. Certain basic conditions, such as the nature of the wool fibre[38] and the general levels of wages here and abroad, are of course, beyond the power of the wool manufacturers to modify. Accepting them as either fixed or at best slowly changing, one might look

before Ways and Means Committee, Hearings on General Tariff Revision, 1921, pp. 2650 seq.

37. The woolen branch is integrated in all countries; but some comparison might be made as to the degree of specialization in each. The average difference is not great.

38. Cf. Taussig, Some Aspects of the Tariff Question, pp. 357 seq.

for more immediate progress in any of at least three directions: improved technical equipment, more closely regulated wage conditions for the wool manufacture itself, and the extension of standardized production.

Students of the wool-manufacturing industry will recall that the period from the introduction of the early English equipment (especially 1790–1800) to about 1840 was one of extraordinary technical advance, in which American contributions played no inconsiderable part. Such contributions included automatic machinery for the manufacture of card clothing, the cylindrical shears, the cylindrical press, and especially the ring doffer, a device of almost revolutionary importance.[39] By the end of that period, the mechanical groundwork of the present industry had been laid so far as the woolen branch is concerned.[40] Subsequent advances in this branch of the American manufacture have consisted in part of increasing the size of the original machines and in part of sporadic inventions, such as the automatic feed for carding machines and the open-shed loom. Development abroad has been along the same lines, inventions of no greater importance taking the place of those just mentioned for the American industry. One cannot say that the part played by the American manufacture has been wholly passive in this latter period — merely the acceptance of foreign developments; nor on the other hand that it has been one of superior progress as compared with that of the foreign industries. And in this relation the future does not promise any amelioration, but rather the reverse, in view of the keener interest being taken especially by the British and Germans in technical inquiry.[41]

39. Lacking it, the woolen branch of the industry might well have developed drawing operations similar to those still retained by the worsted branch.

40. There was practically no worsted production in this country at that time.

41. On account of relatively direct methods involved in the woolen branch of the industry, there is little or no probability of alteration through the elimination of any

The worsted branch of the American industry has had an essentially different history. Until the 50's, it existed only as a handicraft manufacture of negligible quantity. After the invention abroad of the mechanical combing machines, the worsted yarn manufacture, at first of the English type only, was imported into the United States and set up in the factory form; but it was imported *in toto* and with a well developed technical equipment. Later, in the 80's, when the Continental system was first introduced, it was brought in with an even more highly developed technique. Since their importation, the methods and equipment of worsted yarn production have received no important change originating on this side of the Atlantic. Even increases in the size of machinery have come chiefly from abroad, because of the relatively late development of worsted machine building in the United States.[42] For the Bradford system this means passiveness of nearly three-quarters of a century, and, as already intimated, the Continental system cannot continue to qualify as an "infant industry." The reasons for this imitativeness are uncertain: whether the spell of the British or Continental precedents, the influence of the proprietors and foremen of foreign birth who always have been more numerous here than in the woolen branch, the lack of an adequate and stable machine-building industry, or a complacency fostered by a high tariff wall, particularly favorable to worsteds, and a rapidly expanding domestic market.

existing steps in the manufacturing process. Advance would be looked for along the lines of improvements such as frame spinning of woolen yarns, of a better understanding of the processes, their perfection, saving in materials through reduction of wastes and of imperfect goods, and the like. Much remains to be done in such particulars.

42. The recent development of the automatic box loom for the joint weaving section of the two manufactures, tho of more immediate value in worsted weaving, is the product of the machine-building industry rather than of either branch of the wool manufacture.

Another possible alternative, of course, is that improvement *could* not have been made in the last half-century. Indeed, a British worsted spinner of prominence said recently of the present worsted-spinning equipment that "so far as machinery in principle is concerned, we have gotten to the limit of invention";[43] and it is true that abroad as here such equipment has not been changed in principle in recent decades. Unlike some other industries such as coal mining or steel working, the chief textile manufactures all seem subject to diminishing returns so far as technical improvement is concerned. No country has in the last twenty years been making an advance in wool, cotton, or silk manufacturing technique comparable to that made fifty years ago; and at least for the wool and cotton industries the advance has been far less than made a century ago. However, in view of some of the developments in the British industry in the last decade or so, and the progress that has been made in recent decades in minor American textile industries such as knitting and carpet manufacturing, a real stagnation seems improbable. An abbreviation of the tedious gilling and drawing operations in the worsted process, one would hope, must some time be devised, and the world is waiting impatiently for a reformation of the wasteful and noisy weaving operation.[44]

At all events it may be said (reverting to our main topic) that scientific investigation has been going forward or is going forward much more rapidly in foreign

43. Journal of the Bradford Textile Society, July, 1917, p. 26.

44. The Belgian system for manufacturing semi-worsted yarn, which eliminates combing, is an illustration of what perhaps could be carried further in worsted yarn production; and numerous experiments have already been carried through in attempted reformation of the present loom. Col. John P. Wood, appearing before the Ways and Means Committee recently on behalf of the wool-manufacturing industry, indicated his belief that self-sufficiency in that manufacture could only come "by some revolutionary discoveries and machines which are not yet in sight." Hearings on General Tariff Revision, 1921, p. 2577.

countries than in the United States. Even inventions or improvements coming from our manufacture, if of an isolated variety, would have little permanent effect on the comparative strength of American and foreign industries, since in these days improvements cannot be kept secret long. Only steady and unremitting endeavor along such lines would avail, and our manufacture is not in the position or spirit to make that endeavor. The leading organizations in the American industry show no interest in the deliberate promotion of research and invention, and our textile journals, presumably following the tastes of their clienteles, devote little space to the matter. None of the interest and activity along these lines which seems to infuse, say, the British manufacture is apparent in our industry. Accordingly we can hardly anticipate that future progress in technical equipment will emanate from American sources; we can hardly hope for increased competitive power in our manufacture from this quarter.

Advance through a better control of wages in the wool manufacture itself is possible only by means of increased coöperation among American manufacturers. As long as competitive bidding for employees exists, wages are bound to be maintained frequently at unnecessary heights. Some rather informal understandings have, to be sure, been created at times in the past among mills in certain localities, but these have not had sufficient strength to be very effective.[45] The wool manufacture in this country is not as definitely localized as that of Great Britain, but the greater portion of it could, I believe, be satisfactorily organized. However, at best advance along this line would be only a palliative. The general level of wages would be little affected,

45. It is perhaps a matter of regret that the National Association of Wool Manufacturers did not lead the way in this matter when in 1919 it had an opportunity. No doubt there were various reasons why that Association might hesitate.

and the American industry would still be compelled to pay substantially higher wage rates than most foreign manufactures.

The third possible path of advance, that of standardized production, as above noted, has already been extensively traveled. Some further progress is undoubtedly possible. Standardization of tops and yarns could come from within the industry and would facilitate manufacture so far as the American production is or becomes differentiated. Standardization of cloths is in large part dependent upon the vagaries of popular demand. Moreover, it may be noted that one force making for large-scale production in these standardized or semi-standardized goods, that of demand from the wholesale clothing trade, is not likely to be much strengthened in the future, except by the growth of population and like slow-moving factors. Indeed, it is much more probable that the next decade will in this regard yield a further advantage to our competitors, England and the Continent, through the increase in scale of their representative woolen and worsted enterprises consequent upon the extension of their ready-made clothing industries. In this matter, then, the American mills can do little more than adhere as far as possible to the standardized or semi-standardized goods already developed, permitting novelties and the finer grades of fabrics to come from abroad. Surely competitive strength cannot increase either in the individual mill or in the industry as a whole if production is permitted to run the "ranges" and patterns, to fritter its energies in relatively small orders, and to attempt the fine workmanship of the leading Huddersfield or Bradford establishments. The closer American mills cleave to typical American manufacture, the stronger will be the industry as a whole.

What conclusion can be reached, having regard to the conditions above outlined, in the field of tariff policy? It appears that, tho there are possibilities of greater competitive strength in the American wool manufacture, the probabilities of effective advance are not great. Little is being done to put the domestic industry in the way of progress, either in the matter of technical improvement or of wage control; nor is effort being made toward the standardization of those articles — such as tops and yarns — in the development of which the industry as a whole might have influence. The deductions to be drawn from these general conditions of possibility and probability obviously will differ sharply according to one's economic or political faith. For one who views with regret the indefinite maintenance of tariff aid for any industry which shows no real prospect of ultimate self-sufficiency, the situation is discouraging. He cannot recognize in the wool manufacture as valuable a member of the body economic (if one may use the phrase) as the majority of our more important industries. On the other hand, for the protectionist who believes that domestic industries, whatever their competitive strength or future prospects, should be given the amplest support against the cheaper-working foreign manufactures, the details and the exact measurement of the comparative disadvantage in the American wool-using industry are of no consequence. It suffices for him that there is real and apparently permanent disadvantage. And to him the case is conclusive for the continuance of a system of duties on woolen and worsted products substantially like that which has been in force during the last half-century.

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# REVIEWS

## CHARLES RIST ON GERMANY'S WAR FINANCES

PROFESSOR RIST'S new book [1] is a notable survey of an important subject. True, the time is not ripe for an exhaustive study. Essential German data are not yet available. Intensive studies by competent German economists must precede a complete and perfect appraisal. We are yet too near to the war, too much under the influence of the war's emotions, to attain at all points the truest perspective. But we need, while the experience is still fresh in our memories, competent preliminary studies of war-time policies and theories — those of belligerents and neutrals alike; the more because so many lessons which it should teach are sorely needed in the painful return to normal conditions. Such a preliminary study Professor Rist has written; it is the best which the reviewer has seen for any country, and, for its intended readers, it will rank as a model of its kind.[2]

The book is an outgrowth of the writer's activity as an associate of Professor Lichtenberger in editing war documents. In this capacity he followed, day by day for four years, the course of events in Germany and the expressions of German economic thought. Probably no one today, at least outside of Germany, can speak with equal command of the relevant literature. Furthermore, as economists do not need to be reminded, Professor Rist approached his task with the invaluable background of an intimate understanding of the

1. Charles Rist, Les Finances de Guerre de l'Allemagne. Payot et Cie, Paris, 1921.

2. Professor Gaston Jèse has published several installments of an excellent treatise on French war finance which is more exhaustive and therefore more valuable for the student of public finance, but hardly the equal of Professor Rist's in incisiveness, balance, and interest.

development — and vagaries — of economic thought over the past century and a half. The novel and peculiar problems of the war brought about, in every country, a continuous struggle of conflicting theories, and the right ones did not always triumph. Hence the analysis of economic opinions must be an integral part of any comprehensive examination of war policies. Readers who know Professor Rist only as a historian of economic doctrines will find him no less competent as a critical reviewer of facts and policies in a field where assembling, selection, and exposition of data constitute a task of no small magnitude.

The book is avowedly written for a French public. As the author writes in his preface:

> [Germany's finances] will have, for years to come, too direct a bearing upon French finances for a Frenchman to neglect them. Their history during the war gives the key to their present situation. This is the excuse for this book. I have made no pretense of instructing specialists in the science of finance. I have had primarily in mind a public which has a right to be informed upon questions which concern it so closely.

He seeks especially to enlighten French public opinion upon the fallaciousness of certain economic and financial doctrines, particularly in the realm of money and foreign exchange, "which the calmer reflection of years of peace had shown to be inaccurate and dangerous." He is frankly disturbed by the strength of mercantilist opinion in France, with its narrowly nationalist policies, its "old protectionist pharmacopeia," its tendencies toward thorogoing government regulation. "For France in particular," he believes, "that is the road to ruin." Professor Rist's analysis, however, should be widely read outside of France. Altho France may be the country most vitally concerned in Germany's future financial policies, and may be peculiarly exposed to the contagion of false doctrines "made in Germany," no student of affairs can question that the policies and progress of Germany and France in the next few years will profoundly affect the progress and policies of the rest of the world, especially the great exporting nations; and no competent observer abroad, even

in Adam Smith's land, can afford to cast stones at French and Germans as one who himself lives in a land of right thinking.

The book is brief, clear, well proportioned and couched in simple, charming French. It is to be hoped that translations will be made available for the large intelligent public who command only a single tongue. Economists will especially appreciate the guide to the literature of the subject which the footnote references provide; and many other readers will enjoy the footnote comments no less than the text. After Mr. H. G. Wells' popular volumes on the history of the world, surely the day is past when it is necessary to omit or apologize for footnotes in a book intended for a wide circle of readers.

War finance, as most of us realize more clearly than we did ten years ago, is not a simple matter of public expenditures, taxes, and loans. It involves important banking policies, as well as regulation of trade, foreign exchange, commodity prices, and security issues. It ramifies through the whole economic organization.

Professor Rist's study throws this fact into bold relief. Little space is devoted to expenditures, and two chapters out of eight suffice to deal with loans, taxes, and the budget, except so far as these figure again in the brief discussion of the fifteen months after the armistice. Half of the book, the better half indeed, is concerned with finance in the sense of banking, currency, and exchange — pre-war banking preparations, financial mobilization at the outbreak of the war, currency inflation, Reichsbank policies, the depreciation of exchange and attempts to check it. The Reichsbank occupies the center of the stage. The government policy as such, linked with Helfferich's name, incurs the author's criticism; the Reichsbank policy under Havenstein's leadership, on the other hand, he regards as on the whole ably conceived and masterfully executed, brought to grief only by the "indefinite prolongation of hostilities, crowned by the military debâcle and the revolutionary crisis."

The opening chapter furnishes support for those who account Germany the arch-plotter of the war. Clearly her leaders looked forward to war and made plans to meet the

exigency. After the Kaiser-humiliating Agadir crisis in 1911, in obvious anticipation of an early return of such an emergency, measures were promptly taken to put the financial machinery in readiness to stand the shock of war. Most of these were banking "reforms," justified in some degree on commercial grounds but in the main as essential to meet the threat of hostilities. Under the influence of the president of the Reichsbank, the big banks practically discontinued short time borrowings abroad, the dependence upon which had been a seriously restraining influence in 1911. Pressure was exerted, tho with less success, to force the joint stock banks and private banks to strengthen their reserves. With the aid of emergency taxes imposed in 1913, the government war chest at Spandau, formerly 120 million gold marks, was trebled by the addition of equal quantities of gold and silver. The Reichsbank extensively increased its gold reserves: considerable purchases of gold were made at a loss; still more was absorbed from circulation by expanding the issue of small bank notes, encouraging private issues, and stimulating the substitution of paper for gold in payments by private companies and the railway and postal administrations. So successful were these efforts that the Reichsbank balance sheet for July 23, 1914, showed a reserve of 93 per cent of the outstanding notes, and a legal margin of issue of 3,358 million marks — both figures large beyond all precedent. Meanwhile financial experts worked out detailed programs for financial "mobilization" to be filed with the plans for military and naval mobilization.

The experience at the outbreak of war justified the care in preparation. The Reichsbank promptly assumed the rôle of a state war bank. Into its coffers the Spandau chest emptied its treasure. The discount rate, altho raised by one per cent each on July 31 and August 1, was only 6 per cent at its maximum. Loans were freely made to individuals and companies; private bills in the Reichbsank portfolio increased from 751 millions to 2980 between July 23 and August 15. On the latter date, discounted treasury bills reached 1446 millions. Notes and deposits rapidly expanded accordingly, but

so well did the reserves keep pace that the ratio of metallic reserves to note issue did not fall below 36 per cent in these early months of the war.

The war loan banks (*Kriegsdarlehnskassen*), legally separate from the Reichsbank but virtually directed by it, began on August 8 to make advances on a wide variety of securities to merchants, industrial establishments, commercial and savings banks, coöperative credit societies, and individuals, eventually becoming bankers to the states and municipalities. Their notes (*Darlehnskassenscheine*) served partly as additional legal tender currency but even more largely, in time, as elements in the Reischsbank reserves: as it authorized loans by these institutions, the Reichsbank exchanged its own notes for war loan bank notes and then held in its vaults such amounts of these as it needed to maintain the legal reserve ratio. It is a remarkable commentary upon the German mentality that this farcical procedure of maintaining a legal reserve could be gravely kept up until the present year. The war loan banks furnished a convenient supplement to the operations of the Reischbank and joint stock banks, relieving the ordinary banks from the necessity of extending their loans, as happened generally abroad, to meet the special needs.

Thanks to these measures for indefinite expansion of currency and credit, Germany was able to avoid resort to a general moratorium, and exhibited, two months after mobilization, the appearance of "an almost normal financial situation." Various partial moratoria were, however, established, and Professor Rist thinks it doubtful whether Germany gained more than an empty boast by avoiding the moratorium which was so commonly established abroad. None the less, the financial mobilization at the beginning of hostilities must be regarded as distinctly successful.

The German government's own loan policy was simple in the extreme. Regularly twice a year, with true Prussian precision, loan campaigns were launched to raise, on substantially uniform terms, unlimited amounts of 5 per cent war loan bonds. The nine loans yielded 96 billion marks — a success

which astonished the Germans themselves and led foreign observers to question the genuineness of the procedure. Professor Rist, however, denies that the success was illusory, and is at pains to explain how such quantities could be derived from genuine savings or liquidation of assets. On the one hand, it involved the diversion to war uses of the huge annual savings which Germany had previously been exporting or transmuting into permanent physical form at home. On the other hand, it necessitated maintaining a free flow of liquid assets and a constant readiness to invest them. The story is interesting and significant. Between the loan issues, furthermore, funds were provided by successful appeals to banks and capitalists to absorb treasury bills, which were subsequently accepted in payment for war loan bonds. How far short of complete success were the loan campaigns is indicated by the fact that at the time of the armistice, shortly after the issue of the ninth loan, the floating debt amounted to 45 billion marks, nearly half the amount of the funded debt.

The main features of the German war budget policy are well known — to maintain by taxes the equilibrium of the ordinary budget, kept artificially at substantially the figures of 1914; to throw into an extraordinary budget all military and naval expenses, and exceptional expenses of most other types; to cover the extraordinary budgets by loans, to be retired by indemnities imposed upon conclusion of the war; and to increase the tax burden only to provide for interest on the growing debt. Students of politics and public finance will be especially interested in the story of the conflict between the states and the federal government and the eventual centralization of the tax system, to which the pressure for new tax revenues led.

In the discussion of inflation and the monetary policies of the Reichsbank, Professor Rist is at his best in combining exposition of facts with critical analysis of German opinion. How the reserve ratio of one-third was maintained, how the facts of inflation and currency depreciation were denied, how favorable contrasts with French currency expansion were made by neglecting war loan bank notes in circulation, how

Belgian and Polish notes were replaced by German currency, how and why the extension of the check was pressed, how deliberate insincerity was mingled with ignorance — it makes another interesting story.

The chapter on exchange rates, the reasons — actual and assigned — for their fluctuations and particularly the decline of the mark, and the measures taken to correct the depreciation, is likewise an excellently balanced combination of facts well presented and theories critically considered. German treasury and Reichsbank officials insisted that the rise of the foreign exchanges reflected merely the interruption in trade and in financial relations with German's foreign creditors, and in no way reflected upon the soundness of her currency or internal finance. Only a few German writers, such as Lansburgh, editor of *Die Bank*, recognized in print the rôle of the currency inflation and its causes in government borrowing. Hence the comparative failure of measures designed to support the mark — gold shipments, restriction of imports, control of exchange, sale of foreign bills, and floating of loans in neutral countries. Here it is that the available facts are scantiest; but it is clear that the best of efforts in those directions served merely to retard the fall of the mark.

The chapter on war indemnities is essentially a discussion of indemnity theory, first as reflected in German writings and, second, as embodied in the Versailles treaty. Professor Rist sets forth with special approval the views of Lansburgh. As "reparations" to repair the ravages of war, indemnities are useful and may be "an absolute necessity, a condition vital to existence." As reimbursement of war expenditures, on the other hand, they are as dangerous as a feast to a man who has gone hungry for years. In general, German writers accepted unquestioningly the view that Germany must impose heavy indemnities upon her defeated enemies and, that she would profit from them. Their discussions related chiefly to methods of collection. It was easily recognized that payment in specie would be feasible only within narrow limits. Payment in securities came to be accepted as the preferred method, to be supplemented in slight measure by payment in kind. There

is no evidence of adequate appreciation by German writers of the conditions which underlie the use of securities. The strange notion that practically unlimited sums could be exacted through the device of security transfers deserves rather more criticism than Professor Rist directly accords it.

In his own consideration of the reparation clauses of the treaty, however, Professor Rist makes clear that he accepts no such conclusion. He agrees with other authorities that German holdings of foreign securities cannot bulk large in the indemnity payments, that her ability to pay in services is materially lessened by the confiscation of her merchant fleet, and that she can pay in specie to only an insignificant amount. He recognizes frankly that Germany must ultimately pay the indemnity primarily by her exports of goods. Hence boycotting German goods, economic warfare, raising high protective tariffs, all operate as limitations upon Germany's capacity to pay; and at best her ability to pay is limited by her capacity for export and the readiness of foreign markets to absorb her products. "The very idea of war indemnity is really a direct blow at protectionism." Yet thousands of Frenchmen, unaware of this inherent opposition, are at once ardent protectionists and loud supporters of a huge indemnity. Valuable as it is, the chapter is unfortunately too short to satisfy the appetite of readers who have fed for three years on the husks of indemnity discussions.

In a study so timely and successful one may overlook the few omissions, deficiencies, and minor slips that were inevitable. The reviewer must confess, however, to one disappointment. There is no chapter in which the author sums up the outstanding conclusions to be drawn from the study, what are the sound principles of war finance which Germany observed, what the unsound principles which she followed to her detriment. Nowhere does he sketch the outlines of a normal program of war finance, under such conditions as Germany faced, or point out specifically the significant bearings of the war-time experience upon post-war policies. Such a concluding chapter, in part a mere summary, would also afford opportunity for critical consideration of such questions

as to how far currency inflation was inevitable, and how its evil effects and after-effects might have been prevented or mitigated. For such a chapter one could even spare the necessarily incomplete discussion of developments since the armistice. Adequate treatment of this broader subject will be easier when the war finances of all the leading countries have been carefully studied; and perhaps it is too much to expect it in a preliminary study. For generalizations of this character, it must be said, Professor Rist's volume contributes useful material, and his own conclusions from Germany's experience are often implicit when they are not very specifically expressed.

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## CASSEL'S THEORETISCHE SOZIALÖKONOMIE[1]

PROFESSOR CASSEL'S book on The Nature and Necessity of Interest[2] established his position as one of the leaders of thought in the field of economic theory. *Theoretische Sozialökonomie* represents the completed program of which the earlier work was an installment, and which, as the author reminds us, was sketched as early as 1899 in an article entitled "Grundriss einer elementären Preislehre." It is properly to be described as a monumental work, and will disappoint none of the high expectations which those familiar with the earlier book and with the author's other previous writings in German and Swedish will approach a systematic treatise from his hand covering the entire field. The main object of the work is stated as the "repudiation (*Abschaffung*) of value theory" and erection of a complete theory of social economy on the basis of price alone.

The general attitude of the work is, therefore, that of "pure theory" of the objective type, but the presentation is non-mathematical. It is characterized throughout by keen analysis, rigorous deduction and carefully accurate statement. The author pays his respects in a short paragraph (p. 21) to the historical and descriptive method traditional in Germany, remarking that economic activity is forward and not backward looking, and consumes little space in justifying the use of hypotheses and assumptions which represent a simplification of the facts of life. His procedure is the familiar and unquestionably correct one of beginning with extremely simplified conditions and adding complications by stages, approaching by successive steps to the intricacies of actual phenomena. And he is fairly careful to state accurately and completely the assumptions with which he is working at any stage, to keep it clear to himself and the reader what factors

1. Gustav Cassel, Theoretische Sozialökonomie. Leipsic, C. F. Winter, 1918. Pp. xii, 582.

2. London, 1903.

are assumed to be given and what are variable. In short, the author has, in the reviewer's opinion, adopted the most fruitful method of investigation of theory problems and used it with the highest ability and skill; he has written just the sort of book the reviewer would have liked to write. With this statement as a background it will be permissible in a brief sketch to select for notice mainly from the more important points at which the author's theories, or at least his statement of them, seem open to difference of opinion.

To begin with, the "repudiation of value theory" is very good, and the writer is altogether in favor of it — for the first stage in the discussion of economic problems. But should it not be kept in mind also that the ultimate object of economic theorizing is a criticism in ethical and human terms of the workings of the economic machine, and that a theory of value as well as price is indispensable? A correct understanding of the mere mechanics of the price system is undoubtedly the first desideratum, and for this purpose it should be described as far as possible in terms which beg no questions as to approval or condemnation but merely show how the system works. For our part the conviction grows that value (*i. e.*, utility) theory is misplaced and perhaps mishandled in the conventional economics, but none the less is necessary. Equally requisite to the human purposes of the science are: (*a*) a pure mechanics of exchange relations, written in behavioristic terms, setting forth the cause-and-effect relations of a system of pure free enterprise, and (*b*) a critique of the workings of such a system, in which value relations are made as explicit as possible and standards formulated on the basis of a sound philosophy of social ethics. The most serious criticism to be made against most of our economic literature is that through uncritically mixing these two points of view the results in both fields are foggy or fallacious. The critique, indeed, which characteristically runs in the form of a naïve apologetics, is largely fallacious. Economists have been too much inclined to manufacture an ethic of their own to suit their special scientific bias, and the resulting quantity-of-pleasure theory is now happily making way for a sounder

psychology. Even Mill never understood his own ethical position, which was in reality a thorogoing idealism, forced into the false terminology of hedonism.

Again, Professor Cassel seems rather to put himself out to contrast his position with that of the classical economists, and Marshall in particular. In most instances the reviewer is in sympathy with the author's position: it would have been better to put the matter in the way he puts it. But the real issue is not usually vital if allowance is made for crudity of statement by the earlier writers. Especially it is not necessary to disagree sharply with Marshall in order to agree with Cassel where he is criticized by the latter. As everyone understands, Marshall shows a deliberate preference for cautious, not to say "loose" forms of expression, on the ground that they are more descriptive of reality. The world is like that rather than like the rigorous, sharply definite propositions of the logician. One who disagrees with this conception of the method of theory, as does the present writer also for reasons which it would be out of place to develop here, should still appreciate the force of the argument in its favor. And surely no reader of Marshall's appendices, notably the Mathematical Appendix and his remarks on the use of the mathematical method, can imagine that his literary style was not deliberately adopted or that it resulted from lack of capacity or inclination to reason closely.

At some points also, as in the treatment of the Principle of Substitution, of which both authors rightly make so much in the theory of distribution, Marshall is, of the two, closer to fundamentals. In the discussion of rent, too, Marshall has in substance if not in form much more effectively broken with the older classical tradition and is correspondingly nearer to "sound doctrine." A somewhat broader (and less modest) handling of his notion of quasi-rent by Marshall would eliminate the old doctrine of land rent altogether, except as a limiting concept, and this is undoubtedly what needs to be done. Cassel seems to be unaware that the "differential principle" has long since been shown to apply to one distributive share as well as another and hence to tell us nothing

about any of them beyond the nonsensical statement that one factor gets what is left of the product after the other factors are paid, and also that when stated in a form to avoid this truism it is identical with the principle of imputation which he rejects.

This doctrine of imputation or distribution on the basis of specific contribution to product is treated (pp. 88, 89) as resting on the same foundation as the doctrine of marginal utility, which is summarily disposed of (p. 67 f.). To the present writer there seems to be a real and very important difference. The latter doctrine, at least in the form in which it is generally met with, involves the assumption that each addition to consumption makes a determinate addition to the person's total quantity of satisfaction. But it is a part of that false hedonistic psychology which is now happily on the way to the discard that there is any such thing as a sum total of pleasure. We are learning to formulate our theories of conduct either in frankly behavioristic terms, non-committal as to value relations, or else, if we enter the domain of conscious attitudes at all, to get nearer to the facts of the human value consciousness.

The marginal contribution of a factor of production to the total social product stands on a different footing. The total here (measured in price terms of course) and the increment of product due to the coöperation of a small unit of productive factor are real physical magnitudes and entirely determinate under given conditions, even tho not accurately determinable in reality. Professor Cassel justly ridicules the socialistic version of the theory, which uses it to prove that labor produces all wealth, but his objections to the correct formulation in terms of small increments of the factors are weak. He says (pp. 147, 148) that the method manifestly fails when a factor is not divisible, or when the amount of it in use cannot be changed without simultaneously changing the amounts of the other factors with which it is combined. But when a factor is not divisible, as also when the total supply of a divisible factor is controlled as a unit, its share is the total amount of product dependent upon the use of the entire supply, and that under

private property and free contract it can get this remuneration is a plain matter of fact. *If* any indispensable factor *were* indivisible or monopolized, the owner *would* have the world by the throat, and an organization of production and distribution through free bargaining would be impossible.

The second part of the objection also comes down to a question of fact, and the facts are patent to observation. There is practically no limit to the variability in the proportions in which productive agencies of different kinds can be employed *in the system as a whole*, and it is beside the point to observe that the addition of another man may not expedite the digging of a grave. The proportions of the factors are alterable in two ways: first, they are usually very flexible in single industries and establishments, simply by changing the method of production used. There may be discontinuities in the displacement of one factor by another in a single industry, but hardly in society as a whole, or any considerable part of it. And besides, there is practically *no limit* to the variability of proportions in the system as a whole, *even with fixed proportions in every single industry*, through the relative expansion of one industry at the expense of another using the factors in different proportions. With either of these modes of variability operative, competition would work out an apportionment of income on the basis of marginal contributions; and in fact both are operative.

The truth seems to be that Professor Cassel, like many other writers (notably Hobson), has been led by ethical prepossessions to deny a theory of the mechanics of distribution which it is not difficult to show has no ethical implications whatever, tho some of its sponsors (notably J. B. Clark) have thought it had. It is interesting too that the alternative theories proposed are rather readily shown to be reducible to identity with the marginal contribution theory. This is quite true of Professor Cassel, as it was of Wieser, who also threw specific productivity out of the window only to usher it in at the door in a rather thin disguise.

Professor Cassel's own theory of distribution is to be found in his First Book (chapter IV, section 16; The Mechanism

of Price Fixation), and this part of his work is far superior to the Second Book, on The Prices of the Productive Factors, to which the foregoing criticism relates. The latter, very ably argued, is indeed rather conventional in its drift and conclusions. About a third of it, the long chapter on interest, is substantially a condensation of the author's earlier book on this subject, referred to above.

This short section of a dozen pages on price theory is the core of the whole book and represents a notable contribution. It is perhaps open to criticism for not going far enough along the line on which the author strikes out. In the first place, the whole of price theory is treated as a unit. It may be necessary for elementary exposition to separate the subject of "value" (the prices of consumption goods) from that of "distribution" (the prices of productive services) and to assume that certain prices are subject to readjustment while others remain stationary, but the result is misleading. Economic theory has suffered too long from the practice of assuming "other things equal" under conditions where they cannot be so, *i. e.*, from assuming factors constant which must be affected by the very change momentarily under discussion. Our author does start provisionally with simplified assumptions, first that the supplies of all commodities are given, as also the demand preferences of individuals and their incomes. Then the demand for any commodity is a function of the prices of all the commodities in the system, not of one alone as generally stated. Thus we have as many equations as there are prices to be determined, with the prices as the only unknowns. Then, introducing continuous production instead of given supplies, it is assumed that known amounts of each productive service are used in producing the different goods, and the prices of the productive services are found in terms of these amounts and of the prices of consumption goods. And so on. The argument is carried forward step by step, showing how with each new variable a new equation is introduced and so the conditions of solution maintained, and that in the system as a whole there are enough relations between the variables to determine them all, in terms of each other.

But some of the author's reasoning is extremely hard to follow, and at one point it appears to break down. When the assumption as to fixed income for each person in the system is dropped and incomes become a new series of variables, an element of indeterminateness appears which the author attempts to circumvent by loading it into the form of the functions and the general theory of money. This is unconvincing, especially since it appears that there are no constants left in the system at all. But there *is* one set of constants in a static economic system, and that is the amounts of each productive factor owned by each person in the system. The overlooking of this element is in harmony with the author's general failure to emphasize the fact of private property as a fundamental feature of the economic order and a prerequisite to freedom of contract, and also with his overemphasis of the similarities between the principles of economics for a socialistic and for a competitive society. (The last might be called a "good fault," since the opposite error is the common one).

A way around the difficulty of indeterminateness is provided by using these absolute numbers which show the amounts of the productive factors in the society and the distribution of their ownership, and by extending Professor Cassel's method and dropping altogether the assumption that any of the variables are provisionally constant. In formulating the demand functions it is in fact necessary to treat each individual in the system separately. Any one individual's demand for any commodity is then a function of the prices of all commodities, and of that individual's money income. If there are $N$ individuals in the system and $n$ commodities, there will obviously be $Nn$ of these "psychological functions." Then if there are $\nu$ productive factors in use there will be $n\nu$ "technological functions" each expressing the marginal contribution of some one factor toward the production of some one commodity, as a function of the amounts of all the factors used in making that commodity. These technological functions represent curves of diminishing productivity, as the psychological functions represent curves of diminishing utility if the latter is regarded as having any foundation in reality.

Now reasoning of the conventional sort will establish that under free competition and static conditions the system will tend toward and ultimately will reach an equilibrium in which certain facts obtain, each of which may be stated in a series of equations: (*a*) the (money) income of each individual is equal to his consumption, measured in price terms; (*b*) the amount of each commodity produced is equal to the amount consumed; (*c*) each productive factor is apportioned among the industries producing different commodities in such a way that the specific contributions of all its units are equal in price terms. If these series of equations are written down and the variables tabulated, inspection will show that there are enough relations to determine all the unknowns absolutely, *i. e.*, in terms of the amounts of productive factors owned by all the persons.[3] Moreover, the system can easily be extended to cover progressive, or "dynamic" conditions (which Professor Cassel does not attempt) by simply writing the appropriate magnitudes as functions of time.

The Third and Fourth Books of the treatise must be noticed briefly. The Third deals in an exhaustive and masterly fashion with Money, including bank credit and foreign exchange in their theoretical aspects. The section on Index Numbers is brief but acute. The author holds in the main to the "quantity theory," substantiating his position by a statistical study of world prices and the world supply of gold from 1850 to 1910. For the long swing, he is emphatic: the essential cause of changes in the general price level is the "relative" supply of gold (p. 410). By relative supply he means the ratio between the actual world supply and what the supply at the given date would have been if it had increased at a uniform ratio from 1850 to 1910. This "normal" supply is assumed to correspond to the "demand" for gold, *i. e.*, the amount necessary to maintain a constant price level for the period, arguing from the fact that the price level of 1910 was virtually identical with that of 1850. That is, the "demand for money"

3. If the amount of service rendered by any factor does not bear a constant relation to the amount of the factor but is a function of its price, certain of the functions will be more complicated, but no new unknowns are introduced.

(T/V) is assumed to increase at a constant ratio; or more accurately the demand for gold, tho the relation between the two is not always clear. It is pointed out that the increase in T on the upward swing of a business cycle tends to lower prices, but that this is more than offset by the creation of new circulating medium by banks so that prices actually rise.

We then pass (with the chapter on Foreign Trade as a sort of digression) into the Fourth Book, on The Theory of the Business Cycle, *Konjunkturbewegungen*. This is likely to be the most widely read and discussed division of the work. It is very unfortunate that publication was delayed for some five years after the manuscript was finished. In the meantime students of the subject have become familiar with Professor Wesley C. Mitchell's epoch-making study, equally careful and far more exhaustive and detailed, which our author appears not to have seen. Professor Cassel's treatment is an analysis of what actually happens in the cycle, involving a study of statistics from the whole western world. Little attention is given to explaining the movement in terms of fundamental economic motives.

There is no part of the book but will well repay careful reading. The student will appreciate the excellent printing in Roman type, and must marvel at the clear, readable style, bearing in mind that the author is writing in a foreign language and one in which those born to it do not always succeed in making abstract reasoning easy to follow. The availability of the book for reference would be increased by an index or a more detailed table of contents.

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# NOTES AND MEMORANDA

## PROMOTION FROM WITHOUT

In the history of business enterprise attention has frequently been centered upon the rapidity with which promotion has been won by entrepreneurs. A similar, tho less meteoric, movement brings workers, step by step, to the forefront of their ordinary occupations. I refer not to the familiar customs of promotion, but to a process less known. The artisan has worked out his own scheme of promotion, varying his plan to fit the opportunities, the traditions and the organization of each industry.

Professor Pigou points to what he calls a ladder of promotion, different from that here to be considered — one based on the size of business undertakings. He writes: "When the separate steps in the agricultural or industrial ladder are large, it is difficult for a man adapted, if adequate practice is obtained, for life at one stage, but standing by some accident at another stage, to move to his proper place. Thus to take a hypothetical example: if agriculture or industry were worked exclusively in large units consisting of one or two large entrepreneurs assisted by a number of mere laborers, any capacity for management and direction that might be born among people in the laboring class would have no opportunity for use or development. . . . Thus it would seem that, in the absence of a proper ladder, a great deal of the business capacity born among the working classes must run to waste. If, however, industry or agriculture is organized by way of units of many different sizes, a workman possessing mental power beyond what is normal to his class can, without great difficulty, himself become the entrepreneur of a small establish-

ment, and gradually advance, educating his powers the while, higher up the ladder that is provided for him." [1]

This route of promotion has frequently been commented upon, perhaps because it leads to proprietorship. Nor should such a "training ground of business capacity" be disregarded. For his son, if not for himself, what other goal takes the place of this in the mind of many an American workman? Again and again artisans bewail the difficulty of the entrance of a workman into the merchant class now that our local tea and specialty grocery shops are dominated by chains of stores. These specialty and small local shops furnish in America an entrance into proprietorship in merchandising just as truly as, in Europe, "gardens and small allotments near their cottages for workmen in regular employment elsewhere, large allotments for workmen occasionally taking odd jobs elsewhere, and small holdings for those who devote themselves entirely to work on these holdings, provide in combination a complete ladder from the status of laborer to that of independent farmer." [2]

There is, however, another ladder of promotion which is quite as haphazard, but which stops short of proprietorship, and to this I now turn.

Wherever industries of the same general type are localized there is found a means of promotion based on the quality of product. Plants tend in general to specialize upon certain grades of goods. The plant manufacturing the cheapest grade of goods hires normally the largest number of learners. The learner, when partially trained, moves readily to a higher grade plant. Shifting from plant to plant starts thus as a problem of training. It then becomes a question of promotion among the more experienced workers. Evidence of the relation of labor movement to the grade of product is sufficient to make it appear that what the size of the production unit has been in developing business capacity, the existence of plants of varying grades of the same product has been in developing industrial skill.

1. Pigou, Economics of Welfare, p. 181.
2. Ibid., p. 182.

In every industry there is a tendency for the most alert among the experienced workmen to drift toward plants making the highest quality of goods. In the boot and shoe industry it is the boast of the high-grade shops that they do not train workers; that they can get all the experienced workers they want.[3] Nor is this boast confined to the shoe industry or to American shops. The head of an English firm, of world repute both for labor standards and grade of output, said during a visit to his plant, in answer to a question concerning training, that an industry of their standard should not be expected to train workers.

What is of most interest, then, is the pathway by which these experienced workers journey. Amid all the widespread local and particular business differences can any general trend be found? Seemingly there is some cumulative progress in the drift of the best industrial workers. The railroad repair shops furnish an illustration with historical as well as technical interest. In the eighties and nineties, car repairmen were recruited mainly from the wood-working industries. In periods of depression or in seasons of unusual irregularity, carpenters gladly took the steadier work of repairing. Once in the best organizations, the prestige of being railroad men kept them from shifting. With the gradual use of steel cars, repairmen were recruited more and more from the metal trades. Car repairing then became a step in the ladder for men on structural bridge work. Once in the shop, two possibilities were open. Either one was promoted to be an inspector, starting on the way which led to foremanship; or one was interested in the more technical work which led first to the round house, and later to finer machining work. It is with some apology that old railroad men admit that in the last three years the steps in the ladder of promotion have broken, and repairmen go not to the round house, as in the days of railroad prestige, but to riveting and other shipbuilding operations.

The textile industries furnish a still better illustration.

3. Marshall claims that the shoe industry in America is more specialized than elsewhere. From an organization point of view it is more easy to manufacture one grade of goods, more difficult to manufacture various grades.

Here the technique of the operation is not different on the more fragile and lighter products. Numerous plants often duplicate the same operation. Moreover, establishments usually develop a range permitting many gradations in style and quality of product, in artistic effect, in need for judgment and individuality.

A localized hosiery industry illustrates well the way in which proximity of other industries furnishes a supply of experienced workers. The industry has continued a partial apprenticeship on one operation only. On the other processes the plan of training is so well worked out by the employees themselves that new workers coach each other in which of two or three plants it is best to begin work. The first step will be in a plant doing cotton work on machines of coarse gage. This means rough work, with more or less cotton lint, and above all it means a product of no distinction. The general business situation will, of course, go far in determining how long the worker must stay in a plant; but inevitably a worker with activity of mind will apply at other mills, directly or through friends, until a place is open on a higher grade of work.

Workers, both men and women, discuss this shifting as part of becoming "experienced," not as a problem of wages. The firms with the highest reputation for quality of product have a favorable place in the scale for securing the most alert workmen. Invariably in the hosiery industry a plant doing embroidered silk work will be a plant employing middle-aged and older men. Invariably, too, it will be a plant where supervision is at a minimum, where in normal times no training is given and where labor turnover is not a problem. If the knitters have been trained in America at all, the ladder of experience will have brought them from knitting in a cotton mill of coarse gage to one doing finer and finer work, and ultimately to a plant manufacturing novelty and embroidered silk goods.[4] This illustration is meant to stress the fact that where possible older workers do remain in the same type of

4. This subject I hope to treat statistically in a study of the hosiery industry now in preparation.

industries even tho they may shift from shop to shop. Expertness on a particular operation can often be mastered in a relatively short time. Much more subtle to acquire is the discrimination necessary to handle the materials of the trade. The latter kind of skill is the primary reason for workers remaining with the industry even tho they may move from plant to plant.[5]

Among the skilled trades traveling about can somewhat be laid to journeyman tradition following apprenticeship training. When apprenticeship is not provided the more aspiring worker must himself plan his "real" education. Tradition, however, will scarcely account for steps in training among employees in retail stores. Young persons start in five-and-ten cent stores and small local shops, and gravitate to sales positions in department stores. Among the saleswomen and salesmen in these, especially the men, if chance does not open up an executive position for them to continue with the same firm, there is the separate and more specialized shop. Shoe shops, men's furnishing houses, wholesale carpet and rugs give a chance to the shoe, the clothing, or rug department salesman respectively. Incidentally, this means that the low-priced goods are bearing a large item of overhead for the cost of training for the whole industry. Incidentally, also, in so far as the shifting is part of a training problem, its defects cannot be corrected by the individual firm working upon labor shifting for a single shop.

As regards mobility between related businesses, some of the desirable aspects of a labor market of this kind must be admitted and considered. Marshall mentions as one of the factors in Britain's leadership that "the paths of the ocean have been the universities of an exceptional number of her men." [6] Writers have never done justice to the fact that while the factory system forced a worker to specialize, it opened up for him a place in a larger variety of industries. Managers too

5. In going over the experience of men in the paper industry, the writer found a surprisingly large percentage of workmen who had experience in five and six mills. Foremen and minor executives had worked in plants in various geographic areas, yet remained in the paper industry.

6. Marshall, Industry and Trade, 1919, p. 96.

seldom comment upon the advantage which diffusion of experience brings to their establishment; for, to again quote Marshall, "travellers learn to put on its trial many a habit of thought and action, which otherwise they would have always acquiesced in as though it were a law of nature."[7] During the long period when there were no technical engineers, industry gained by the transfer of knowledge from trade to trade.

It is the contention of this article, then, that shifting from plant to plant is not only more deliberate than is usually assumed, but that the margin within which shifting takes place is not found in each industry, but cuts across all industries, giving a chance for continuous progress in skill; and that in the first stages this area is conditioned primarily upon training and somewhat incidentally upon wages. If this is true, what are its industrial implications?

Obviously, it must affect estimates of labor turnover, as well as our comparisons of wages between industries. It is somewhat of a commentary upon our discussion of labor shifting that we hinge upon the facts of an individual plant, completely disregarding the relation to the rest of the industrial organization in the community. Dr. Ruml has already pointed out the correspondence of curves of "leaving" in firms in the same community when comparison is made over a considerable period. All progressive firms are now compiling "causes of leaving" for their own plant. A few also exchange with other plants. These records stop just short of facts which would give the real motive for changing or any hint of the opportunity which the new work is hoped to offer. Most of the reasons are listed on the assumption that there was something in the plant which was unsatisfactory, rather than with the thought that there is something which the best workers wish to attain. No criticism of the plant is necessarily involved. By reason of its type of product it may afford merely a limited trade opportunity on certain processes.

The plant is likely to lay stress upon promotion to super-

7. Marshall, Industry and Trade, 1919, p. 143.

visory work. The artisan, on the other hand, more usually thinks in terms of steady progress in skill. The machinist thinks less about becoming a superintendent than he does about becoming a tool-maker. His desire for achievement is in terms of trade skill and personal realization of fitness. In modern times, there has always been movement from plant to plant in the same type of industry among employees who felt a desire to "get on" in their trade — a phase of the shifting of workers which has received little attention. No one could claim that all shifting is planned for individual improvement. Need we forget, however, that the same laws are operative in industry that pertain in professional work? Pride of workmanship and quality of product is a motivating force among some industrial workers just as among some inventors, physicians, or teachers. We do not deny interest in his work to the teacher who moves from a small college to one ranking higher in standard, even tho he still prefers to shift, in time, to a great university. May it not be that, for the craftsman, the desire for achievement can be combined with interest in his job?

The central theme of any serious program of industrial relations must be concerned with promotion. The problem must be met, however, in a larger way than by attempting merely to provide incentives which will keep the worker within a single plant through variety in processes, frequent transfer, or scientific rating of efficiency. Desirable as is any method which gives systematic consideration to all persons in a plant for such promotion as that establishment offers, advancement within it is inevitably based upon someone else's opinion of the employee's aptitude for certain work. Fitness for this work may have been unrealized or the promotion may, in the mind of the employee, have been long overdue. In either case there is lacking the challenge to which the craftsman has always responded.

Comparisons of wages between industries must at best be difficult. "Equal work" is not easily defined. Economists have never claimed that at any one time wages on the same work in different industries would be identical. What they

have said is that, on the same grade of work other things equal, wages would in the *long run* tend to be equal. It could easily happen that any producing unit might be securing an unusual group of workmen and pay higher rate of wages for what is equal in name only. Consider, for example, an operation as simple as cone-winding. Some operators prefer to work where no attention is given to the kind of knot tied. On the other hand textile men maintain that certain workers keep applying, until an opening is secured, at a plant known to insist upon one method of tying knots. It may or may not be that a plant with such standards pays a higher wage rate. But there is a difference in stability, care, and skill of workers, and there is an element of promotion and of pride.

The opinion of the writer is that more is necessary in wage comparison than rates, or even average earnings, on identical grades of work. There is needed some study of the actual paths of promotion. Wages on the next grade of product may be preëminently of more practical importance than those on the identical operation. It will not greatly profit an industry to retain the plodding and least ambitious worker, if its policy loses permanently the most alert and technically equipped!

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## THE NEBRASKA DEPOSIT GUARANTY FUND

PERHAPS it is a healthful sign that in states where deposits are guaranteed failures bring criticism of the state departments of banking. Insolvencies cost the sound banks money, for they mean assessments to replenish the guaranty fund. In Nebraska, for instance, where nineteen banks have closed last year and this, there has been effort to throw the blame on the Bureau of Banking. State supervision is always the better for watchfulness and criticism on the part of the banks; but Mr. J. E. Hart, Secretary of the Department of Trade and Commerce and head of the Bureau, says that the statistics of failures and assessments have sometimes been very unfairly used. Correspondence with a number of well informed bankers in Nebraska has, in fact, brought to the writer no evidence of inefficiency in the Bureau.

It is to be remembered, as Mr. J. B. Forgan has said, that examination is always a process after the event. A crook can hide his stealings a long while even from a competent examiner, and sometimes can loot a bank between examinations. In such cases all the supervising authority can do is to close banks as soon as it learns they are insolvent. It appears that in Nebraska this is done, so avoiding the errors of some years ago in Oklahoma, where insolvent banks were allowed to run because there was no money in the guaranty fund and the banking board hoped that the wrecked concerns would get into better condition. They got worse, and eventually cost the fund more than if they had been closed at once. Kansas had a like experience when a former Bank Commissioner delayed closing a bank at Salina, hoping that he could restore it to solvency and thus avoid having to levy upon the guaranty fund. The shrinkage of assets and the loss to the fund continued. Finally, the bank was closed, but the cashier has not been apprehended. Ouster proceedings against the Commissioner were, however, unsuccessful.

The condition of the Nebraska banks as a whole on August 6, 1921, was as follows (000 omitted).

| | |
|---|---|
| Loans and discounts | $212,643 |
| Overdrafts | 1,307 |
| Bonds, securities, etc. | 10,001 |
| Banking house, fixtures, etc. | 7,148 |
| Other real estate | 1,106 |
| Current expenses | 6,248 |
| Cash items | 159 |
| Due from other banks | 37,545 |
| Cash | 9,104 |
| | $285,261 |

| | |
|---|---|
| Capital stock | $25,871 |
| Surplus | 8,157 |
| Undivided profits | 7,786 |
| Dividends unpaid | 147 |
| Individual deposits | 103,467 |
| Certificates of deposit | 121,034 |
| Due to banks | 6,799 |
| Bills payable | 9,904 |
| Depositors' guaranty fund | 2,095 |
| | $285,260 |

The following items are computed from an abstract from the Bureau of Banking covering the affairs of sixteen of the banks closed in 1920 and 1921:

| | |
|---|---|
| Deposits on dates of closing | $4,055 |
| Drafts on guaranty fund | 1,006 |
| Cash in hands of receivers | 336 |
| Unpaid claims for deposits | 2,669 |
| Assets, good | 736 |
| Assets, unclassified | 534 |
| Assets, doubtful | 910 |
| Assets, worthless | 748 |

Three other failures were so recent that like data were not to be had when these figures were assembled. The deposits of the three in November, 1920, were $1,128,000.

After the figures on which the second table is based were made up, and before September 8 this year, $1,626,000 more

was paid out of the guaranty fund on account of banks covered by the table. This makes $2,632,778 paid out of the guaranty fund — say three-fourths of one per cent of deposits—during 1920 and the first eight months of 1921. This is a sum more than there was in the fund at the date of any report in these two years, except the very first report, which showed it to be $2,809,000. The largest single payment was about $700,000, for a bank at Blair; the next in size $300,000, for a bank at Omaha. It is expected that much of this years' payments will be recovered out of the assets of the failed banks.

All these figures have been obtained from the Nebraska Bureau of Banking, through the courtesy of Professor George O. Virtue of the University of Nebraska and of Nebraska bank friends of the writer. In advance of detailed official reports, they are the best yet available. They do not synchronize, but it would appear that the guaranty fund, which on August 6 was $2,095,000, must now have been reduced to $469,000. By the same computation, unpaid claims would amount to $1,043,000 plus the deposits of the last three banks to close, probably less than $1,000,000. Cash in the fund, plus assets classed as good, would not cover the claims.

Considering, however, that the fund can be replenished by emergency assessments equal to one per cent of deposits each year, it will remain solvent. Much wreckage is probably still to be cleared away, and that will be expensive; but the ability to levy two and a quarter millions per annum will, at the worst, take care of all conceivable losses in a very few years.

It will help to tide matters over if Mr. Hart, head of the Bureau of Banking, succeeds in obtaining legislation he is seeking for the postponement of payment of depositors until after the final liquidation of closed banks, giving to depositors in the meantime interest-bearing certificates. Kansas was the first state to adopt this method, and to the writer it has always seemed wise. It leaves at least a little incentive to be careful in picking one's bank; and if the depositors have got only certificates and not cash, the bank wrecker is not made a hero when he comes back to town. The point is not to be

overemphasized, of course, for unquestionably the fact that no depositor ultimately loses deadens public opinion. Certain proceedings in the Salina, Kansas, case illustrate this. The chief benefit of the new legislation will be to let assessments catch up to the liabilities of the fund while the receivers are collecting the realizable assets of the closed institutions.

The writer has said before, in these columns,[1] that in every state where deposits are guaranteed the fund accumulated in cash is too small, and that too much dependence is placed in the fact that assessments can be levied to meet failures after they occur. Nebraska's experience seems to sustain this view. The law contemplates the maintenance of the fund at one per cent of deposits. Now, a reserve of $2,000,000 is not sufficient insurance for $200,000,000 of deposits, even if another $2,000,000 can be levied next year. The fund might easily have become insolvent this year. Bank failures have been fewer and smaller than could have been expected with wheat dropping from $3.00 to $1.00, corn from $2.50 to 50 cents, and cattle from $20.00 per cwt. to $8.50. Nebraska should have a cash fund of at least two and one-half per cent, and it would not hurt the Nebraska banks to raise it. They would have to charge it off as an expense, it is true; but under the Nebraska law they would simply set it aside on their books and have the use of it until called for. Thus they would make just as much money on the fund as if it were still their own property.

This is the more necessary because state-administered insurance — that is what deposit guaranty is — cannot, like private underwriting, avoid concentration of risk. Over $10,000,000 of deposits are at the risk of the fund in Omaha alone, and more than twice the fund, as it stood in August, is at risk in a single bank. The bank referred to is one of standing; but such underwriting is unscientific and might — not in this case, but somewhere, sometime — jeopardize the whole fund. The fund, therefore, should be increased.

It must be borne in mind that insurance of deposits is not the cause now leading to bank failures in Nebraska. In the

1. See the issue for November, 1913, p. 113.

neighboring state of Missouri, where supervision is excellent but deposits are not guaranteed, twenty-two state banks have closed so far in 1921. Fortunately all but one were small, with $50,000 capital or less.

Several more states have established deposit insurance since the writer last contributed to these pages.[2] Now and then even a national banker expresses favor of the plan. The usual objection, discussed before and still heard, is that deposit guaranty requires the honest and competent bankers to make good to depositors the losses of dishonest and incapable competitors. Like objections are inherent in all insurance, and the reader will favor or oppose deposit insurance according to his estimate of its net social utility. The writer is convinced that still more states will be led by the present bank casualties to adopt the plan.

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2. See this Journal for November, 1909, "Insurance of Bank Deposits in the West"; November, 1913, "Four Years more of Bank Guarantee"; February, 1915, "Deposit Guarantee in Mississippi."

A good survey of the subject at large is in the recently published book of Professor T. B. Robb, The Guaranty of Bank Deposits (1921).

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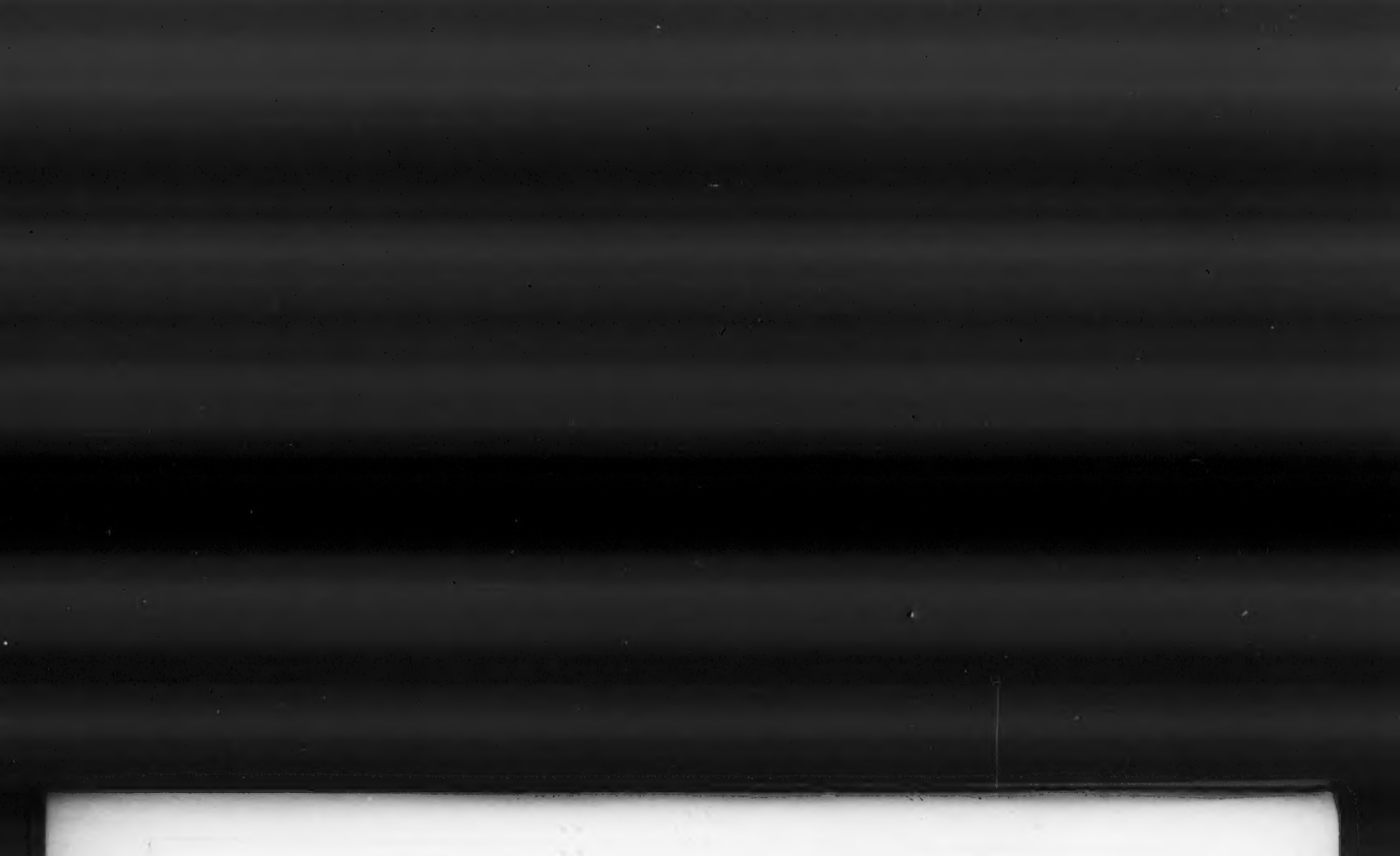
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